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U.S. Department
of Transportation
**National Highway
Traffic Safety
Administration**

DOT HS 808 305

June 1995

Final Report

Moving Deformable Barrier into Left Side of 1995 Solectria Force at 52.9 kph.

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15. Supplemental Notes

16. Abstract

The purpose of this test was to gather data concerning the application of FMVSS 214, "Side Impact Protection - Passenger Cars," in the 48/24 kph 270° driver's side impact mode to electric vehicles. This test was conducted with a 1995 Solectria Force 4-door sedan, VIN 2C1MR529X6756913, at Transportation Research Center Inc. on May 16, 1995.

The impact velocity was 52.9 kph. The vehicle's maximum crush was 346 mm. The ambient temperature was 21° C.

The driver's Thoracic Trauma Index (TTI) was 63.8. The driver's pelvis maximum lateral acceleration was 77.5 g. The left rear passenger's TTI was 89.7. The left rear passenger's pelvis maximum lateral acceleration was 83.6 g.

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METRIC CONVERSION FACTORS

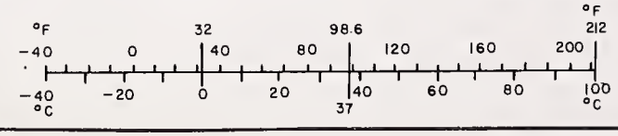
Approximate Conversions to Metric Measures

Symbol	When You Know	Multiply by	To Find	Symbol
	LENGTH			
in	inches	*2.5	centimeters	cm
ft	feet	30	centimeters	cm
yd	yards	0.9	meters	m
mi	miles	1.6	kilometers	km
	AREA			
in^2	square inches	6.5	square centimeters	cm^2
ft^2	square feet	0.09	square meters	m^2
yd^2	square yards	0.8	square meters	m^2
mi^2	square miles	2.6	square kilometers	km^2
	acres	0.4	hectares	ha
	MASS (weight)			
oz	ounces	28	grams	g
lb	pounds	0.45	kilograms	kg
	short tons (2000 lb)	0.9	tonnes	t
	VOLUME			
tsp	teaspoons	5	milliliters	ml
Tbsp	tablespoons	15	milliliters	ml
fl oz	fluid ounces	30	milliliters	ml
c	cups	0.24	liters	l
pt	pints	0.47	liters	l
qt	quarts	0.95	liters	l
gal	gallons	3.8	liters	l
ft^3	cubic feet	0.03	cubic meters	m^3
yd^3	cubic yards	0.76	cubic meters	m^3
	TEMPERATURE (exact)			
°F	Fahrenheit temperature	5/9 (after subtracting 32)	Celsius temperature	°C

*1 in = 2.54 (exactly). For other exact conversions and more detailed tables, see NBS Misc. Publ. 286, Units of Weights and Measures, Price $2.25, SD Catalog No. C13.10:286.

Approximate Conversions from Metric Measures

Symbol	When You Know	Multiply by	To Find	Symbol
	LENGTH			
mm	millimeters	0.04	inches	in
cm	centimeters	0.4	inches	in
m	meters	3.3	feet	ft
m	meters	1.1	yards	yd
km	kilometers	0.6	miles	mi
	AREA			
cm^2	square centimeters	0.16	square inches	in^2
m^2	square meters	1.2	square yards	yd^2
km^2	square kilometers	0.4	square miles	mi^2
ha	hectares (10,000 m^2)	2.5	acres	
	MASS (weight)			
g	grams	0.035	ounces	oz
kg	kilograms	2.2	pounds	lb
t	tonnes (1000 kg)	1.1	short tons	
	VOLUME			
ml	milliliters	0.03	fluid ounces	fl oz
l	liters	2.1	pints	pt
l	liters	1.06	quarts	qt
l	liters	0.26	gallons	gal
m^3	cubic meters	35	cubic feet	ft^3
m^3	cubic meters	1.3	cubic yards	yd^3
	TEMPERATURE (exact)			
°C	Celsius temperature	9/5 (then add 32)	Fahrenheit temperature	°F



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Section 1.0

Purpose and Test Procedure

Purpose

This 48/24 kph moving deformable barrier left side impact test was conducted for Vehicle Research and Test Center (VRTC) by Transportation Research Center Inc. (TRC). The purpose of this test was to gather data concerning the application of FMVSS 214, "Side Impact Protection - Passenger Cars," in the 48/24 kph 270° driver's side impact mode to electric vehicles. The test was conducted with a 1995 Solectria Force 4-door sedan.

Test Procedure

This test was conducted using NHTSA's Office of Vehicle Safety Compliance (OVSC) Laboratory Test Procedure No. TP-214D-03 as a guideline with the addition of a post-test static rollover test to determine if electrolyte leakage occurred into the passenger's compartment. Data was obtained relative to FMVSS 214, "Side Impact Protection - Passenger Cars," performance.

The test vehicle was instrumented with eighteen (18) accelerometers to measure longitudinal, lateral, and vertical axis accelerations. The vehicle was positioned 63° from the tow track centerline.

The test vehicle contained two (2) Part 572 F 50th percentile adult male anthropomorphic test devices (dummies). The dummies were positioned in the rear outboard designated seating positions according to the dummy placement procedure specified as an attachment of the Laboratory Test Procedure. Both dummies were instrumented with primary and redundant spine, rib, and pelvis accelerometers to measure lateral accelerations. Each dummy was restrained by a three-point unibelt.

The moving barrier was instrumented with five (5) accelerometers to measure longitudinal, lateral and vertical axis accelerations. The moving deformable barrier's specified impact velocity range was 53.1 to 54.7 kph. The intended impact point of the left side of the moving deformable barrier face was 940 millimeters forward of the vehicle's wheelbase midpoint. The moving deformable barrier's wheels were crabbed 27° clockwise from the barrier's longitudinal centerline.

The thirty-nine (39) data channels were multiplexed and recorded on a 14-track tape drive. The data was digitally sampled at 12,500 samples per second and processed per Section 12 of the Laboratory Test Procedure.

The crash event was recorded by one (1) real-time panning motion picture camera and six (6) high-speed motion picture cameras.

The vehicle and occupant data are summarized in Section 2.0. The FMVSS 214 data are presented in Section 3.0. The vehicle, occupant, moving deformable barrier, and camera measurements are presented in Section 4.0. Appendix A contains the still photographic prints. Appendix B contains the dummy and vehicle data plots. Appendix C contains the dummy calibration data. Appendix D contains miscellaneous test information.

Section 2.0

Side Impact Test Summary

Test Results Summary

This 48/24 kph 270° driver's side impact test was conducted at TRC on May 16, 1995.

The test vehicle was a Solectria Force 4-door sedan. The passenger's Thoracic Trauma Index (TTI) calculation exceeded 85 g's. The driver's TTI calculation was less than 85 g's. The driver's and passenger's pelvis lateral accelerations did not exceed 130 g's as measured by the Part 572 F dummies seated in the driver and left rear outboard designated seating positions. The vehicle's left side doors did not separate from the body. The vehicle's right side doors remained closed during the impact.

The test vehicle was equipped with a three-point unibelt at the driver's and left rear passenger's seating positions. The vehicle's test weight was 1334 kilograms. The moving deformable barrier's test weight was 1364 kilograms. The moving deformable barrier's impact speed was 52.9 kph. The vehicle's maximum static crush was 346 millimeters.

The driver's Thoracic Trauma Index (TTI) was 63.8. The driver's pelvis maximum lateral acceleration was 77.5 g.

The left rear passenger's TTI was 89.7. The left rear passenger's pelvis maximum lateral acceleration was 83.6 g.

The vehicle's left side doors did not separate from the body. The vehicle's right side doors did not open during the impact. No electrolyte was found in the passenger's compartment after completion of the static rollover test.

Table 1 Test Conditions

Test number:		950516
Test date:		05/16/95
Test time:		1408
Ambient temperature at impact area:		21° C
Temperature in occupant compartment:		22° C
Vehicle year/make/ model/body style:		1995/Solectria/Force/4-door sedan
Vehicle test weight:	Actual:	1334 kg
	Intended:	1334 kg
Moving deformable barrier test weight:		
Actual:		1364 kg
Intended:		1367 kg
Impact point[1]:		
Actual:		931 mm
Intended:		940 mm
Impact velocity[2]:		
Actual:		52.9 kph
Intended:		53.1 - 54.7 kph
Maximum vehicle static crush:		346 mm
Number of cameras:		
Real-time:		1
High-speed:		6
Door opening data:		
Left-front:		Difficult
Right-front:		Easy
Left-rear:		Difficult
Right-rear:		Easy

[1] As measured forward of the subject vehicle's wheelbase midpoint
[2] Speed trap measurement (± .08 kph (.05 mph) accuracy)

Table 1 Test Conditions, Cont'd.

Seat movement:	Front:	Rear:
Seat back failure:	None	None
Seat shift:	None	None

Remarks:

Driver's seat back angle was 25°.

Glazing damage: Both left door glasses were shattered. The left side of the windshield cracked.

Dummies:	Driver #199	Passenger #191
Type:	SID	SID
Location:	Left front	Left rear
Restraint:	Airbag and three-point unibelt	Three-point unibelt
Number of data channels:	8	8

Visible dummy contact points:

Head:	None	C-pillar
Chest:	Door panel	Door panel
Abdomen:	Door panel	Door panel
Left knee:	Door panel	Door panel
Right knee:	NA	NA

Other notable impact effects: None

Table 2 Test Vehicle Information

Vehicle year/make/ model/body style:	1995/Solectria/Force/4-door sedan
Color:	Red
VIN:	
Electric motor data:	
Placement:	Transverse/lateral
Type:	One A.C. motor and gear box
Final drive:	X fwd, __rwd, __4wd
Date vehicle received:	05/09/95
Odometer reading:	155
Dealer's name and address:	NA

Accessories:

Power steering	No	Automatic transmission	Yes
Power brakes	Yes	Automatic speed control	No
Power seats	No	Tilting steering wheel	No
Power windows	No	Telescoping steering wheel	No
Tinted glass	Yes	Air conditioning	No
Radio	No	Anti-skid brake	No
Clock	No	Rear window defroster	Yes
Other	None		

Certification data from vehicle's label:

Vehicle manufactured by:		CAMI Automotive, Inc.
Date of manufacture:		03/95
VIN:		2C1MR529X6756913
GVWR:		1249 kg
GAWR:	Front:	649 kg
	Rear:	619 kg

Table 2 Test Vehicle Information, Cont'd.

Size of tires on vehicle:	P155/80R13
Tire pressure with maximum capacity vehicle load:	
Front:	300 kPa
Rear:	300 kPa
Spare tire:	None
Type of seats:	
Front:	Bucket
Rear:	Bench

Tire & capacity data from vehicle's label:

Recommended tire size:	P155/80R13
Recommended cold tire pressure:	
Front:	220 kPa
Rear:	220 kPa
Designated seating capacity:	
Front:	2
Rear:	2
Total:	4
Vehicle capacity weight:	312 kg

Test vehicle attitudes:

Delivered attitude:	LF:	662	mm	RF:	639	mm	LR:	616	mm	RR:	618	mm
Fully loaded attitude:	LF:	640	mm	RF:	657	mm	LR:	575	mm	RR:	585	mm
Pre-test attitude:	LF:	620	mm	RF:	628	mm	LR:	585	mm	RR:	595	mm
Post-test attitude:	LF:	606	mm	RF:	640	mm	LR:	581	mm	RR:	586	mm

Table 2 Test Vehicle Information, Cont'd.

Weight of test vehicle as received (with maximum fluids):

Right front	260 kg	Right rear	293 kg
Left front	272 kg	Left rear	303 kg
Total front weight	532 kg	(47.2% of total vehicle weight)	
Total rear weight	596 kg	(52.8% of total vehicle weight)	
Total delivered weight	1128 kg		

Calculation of test vehicle's target test weight:

RCLW = Rated Cargo and Luggage Weight

UDW = Unloaded Delivered Weight (1128 kg)

VCW = Vehicle Capacity Weight (312 kg)

DSC = Designated Seating Capacity (4)

RCLW = VCW - 68 (DSC) = 40 kg

Target test weight = UDW + RCLW + (Number of SID dummies x 79 kg per dummy)

Target test weight = 1128 + 40 + 158

Target test weight = 1326 kg

Weight of test vehicle with required dummies and 48 kg of cargo weight:

Right front	302 kg	Right rear	325 kg
Left front	338 kg	Left rear	369 kg
Total front weight	640 kg	(48.0% of total vehicle weight)	
Total rear weight	694 kg	(52.0% of total vehicle weight)	
Total test weight	1334 kg		

Weight of ballast secured in vehicle cargo area: 0 kg

Components removed to meet target test weight: None

CG rearward of front wheel centerline: 1229 mm

Vehicle Wheelbase: 2363 mm

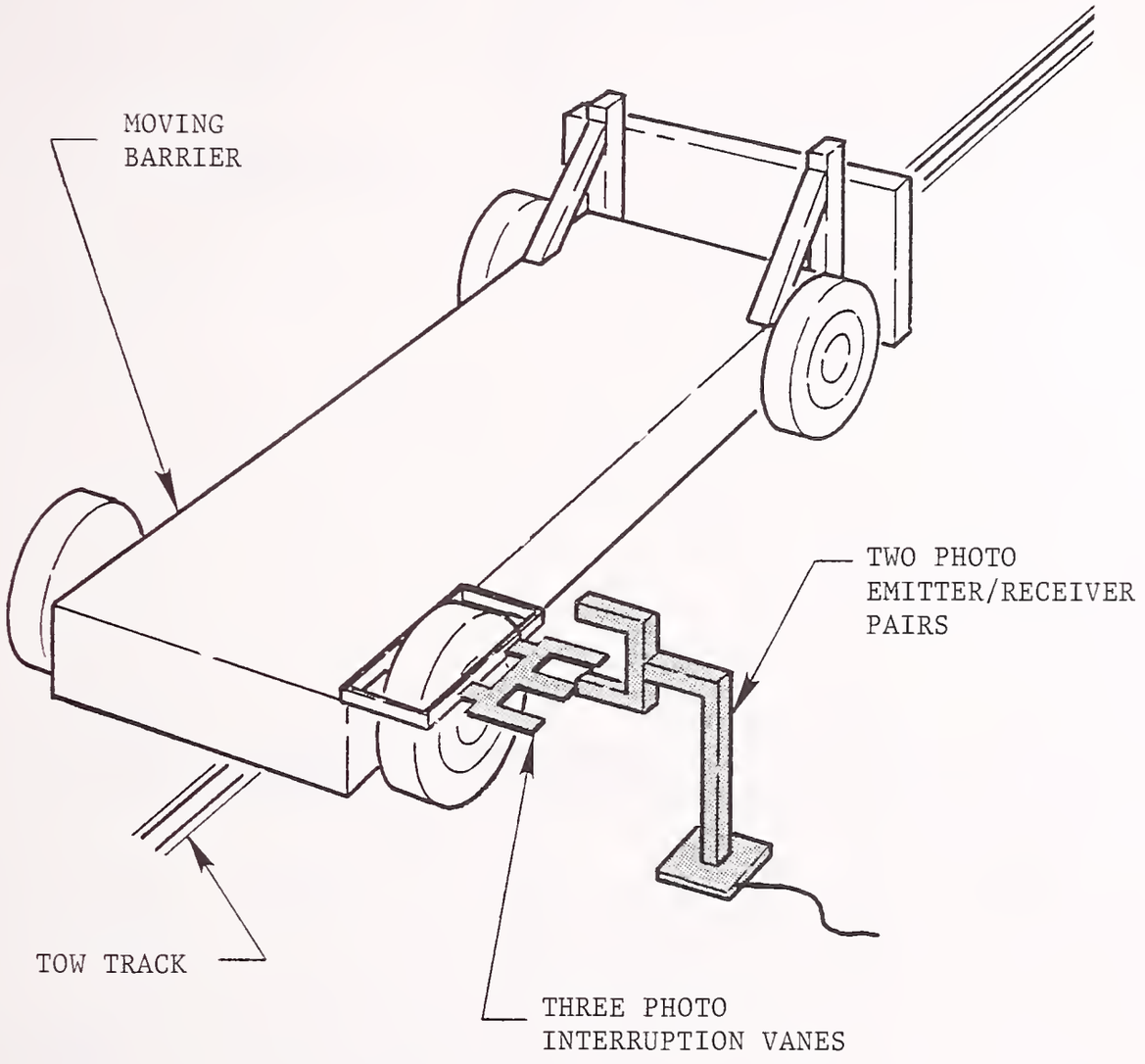
Table 3 Post-Impact Data

Test number:	950516
Test date:	05/16/95
Test time:	1408
Test type:	Left side impact
Impact angle[1]:	270°
Crabbed angle[2]:	27°
Ambient temperature at impact area:	21° C
Temperature in occupant compartment:	22° C
Impact velocity:	
Primary:	52.9 kph
Secondary	52.9 kph
Specified range:	53.1 to 54.7 kph
Distance from barrier to vehicle:	
Entering velocity trap:	356 mm
Exiting velocity trap:	51 mm

[1] Angle measured clockwise from longitudinal axis of struck vehicle to longitudinal axis of moving barrier.

[2] Angle measured clockwise from longitudinal axis of moving barrier to its velocity vector.

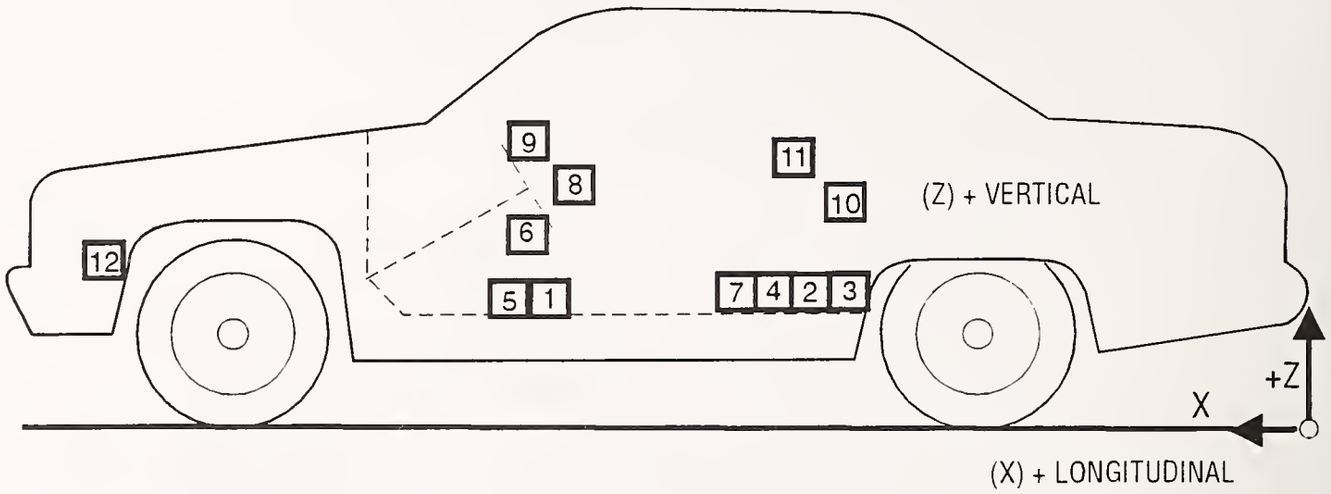
Figure 1 Impact Velocity Measurement System



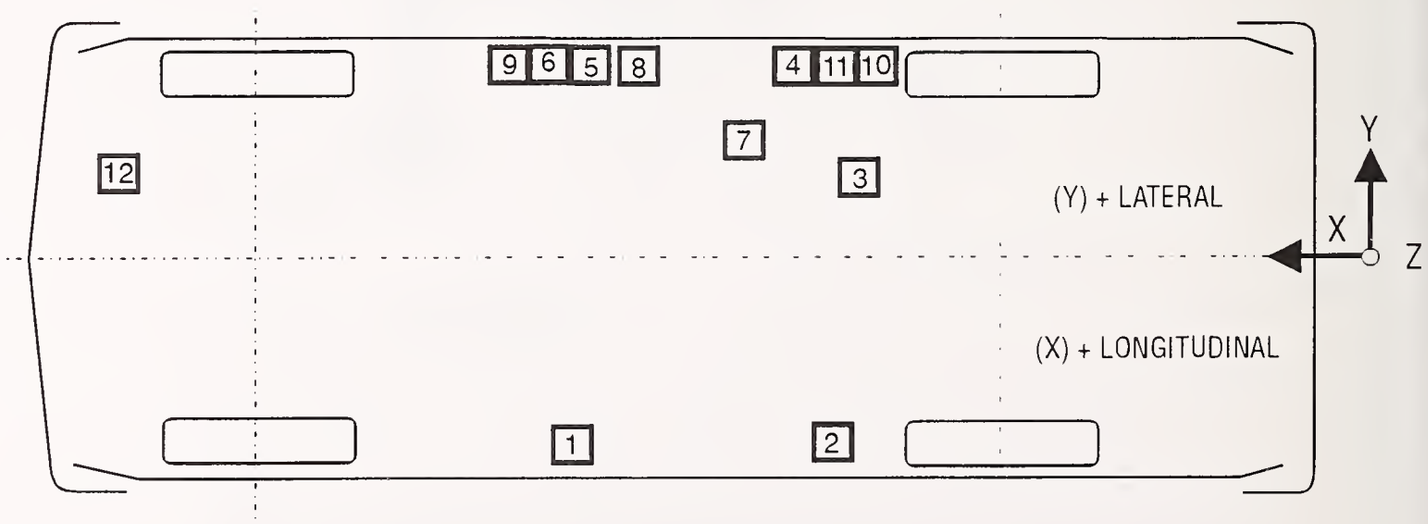
The final vane clears the final emitter/receiver pair 51 millimeters before impact.

The vanes have 305-millimeter spacing.

Figure 2 Vehicle Accelerometer Placement



SIDE VIEW



BOTTOM VIEW

Table 4 Vehicle Accelerometer Locations and Data Summary

TEST NUMBER: 950516 No. LOCATION	X	Y	Z	POSITIVE DIRECTION		NEGATIVE DIRECTION	
1 RIGHT FRONT SILL	1605 mm	614 mm	266 mm				
LONGITUDINAL				7.2 g	@ 21.1 ms	3.7 g	@ 39.0 ms
LATERAL				23.5 g	@ 18.4 ms	4.8 g	@ 60.6 ms
VERTICAL				7.5 g	@ 6.2 ms	5.1 g	@ 53.6 ms
RESULTANT				24.3 g	@ 6.4 ms		
2 RIGHT REAR SILL	2447 mm	617 mm	241 mm				
LONGITUDINAL				6.7 g	@ 11.0 ms	4.0 g	@ 39.0 ms
LATERAL				30.2 g	@ 7.3 ms	4.4 g	@ 51.8 ms
VERTICAL				3.7 g	@ 66.5 ms	6.6 g	@ 43.1 ms
RESULTANT				30.3 g	@ 7.3 ms		
3 REAR BATTERY BOX	3434 mm	353 mm	317 mm				
LATERAL				18.1 g	@ 27.5 ms	2.6 g	@ 132.4 ms
VERTICAL				10.2 g	@ 74.9 ms	10.4 g	@ 49.4 ms
4 LEFT REAR SILL	2444 mm	-620 mm	352 mm				
LATERAL				101.5 g	@ 7.2 ms	75.3 g	@ 11.3 ms
5 LEFT FRONT SILL	1612 mm	-635 mm	261 mm				
LATERAL[1]				---	---	---	---
6 LEFT FRONT DOOR CENTERLINE	1855 mm	-674 mm	548 mm				
LATERAL				109.4 g	@ 9.4 ms	41.0 g	@ 18.6 ms

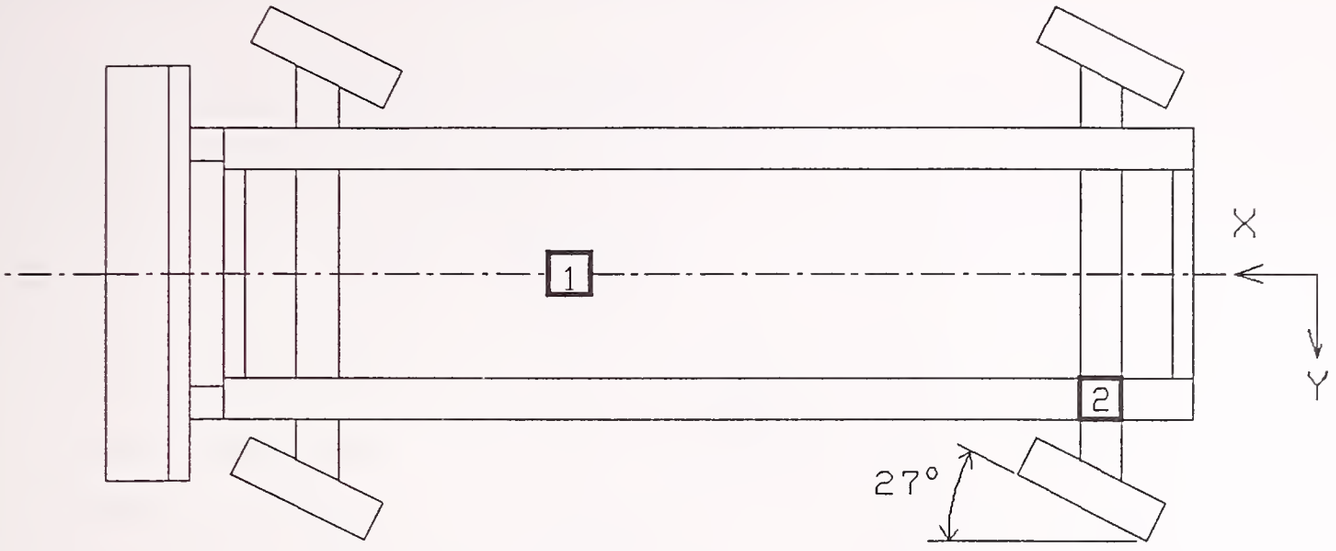
Table 4 Vehicle Accelerometer Locations and Data Summary, Cont'd.

TEST NUMBER: 950516 No. LOCATION	X	Y	Z	POSITIVE DIRECTION		NEGATIVE DIRECTION	
7 RIGHT REAR SEAT	2435 mm	109 mm	256 mm				
LATERAL				28.4 g	@ 6.8 ms	6.7 g	@ 33.5 ms
8 LEFT FRONT DOOR MID-REAR	2074 mm	-672 mm	577 mm				
LATERAL				122.0 g	@ 4.1 ms	57.2 g	@ 19.5 ms
9 LEFT FRONT DOOR UPPER CENTERLINE	1862 mm	-678 mm	796 mm				
LATERAL				122.0 g	@ 4.1 ms	57.2 g	@ 19.5 ms
10 LEFT REAR DOOR MID-REAR	2908 mm	-668 mm	610 mm				
LATERAL				76.0 g	@ 19.8 ms	37.3 g	@ 25.2 ms
11 LEFT REAR DOOR UPPER CENTERLINE	2734 mm	-666 mm	820 mm				
LATERAL				117.9 g	@ 11.3 ms	46.1 g	@ 34.3 ms
12 FRONT BATTERY BOX	714 mm	430 mm	207 mm				
LATERAL				20.8 g	@ 19.5 ms	6.3 g	@ 95.4 ms
VERTICAL				15.2 g	@ 30.0 ms	9.9 g	@ 61.1 ms

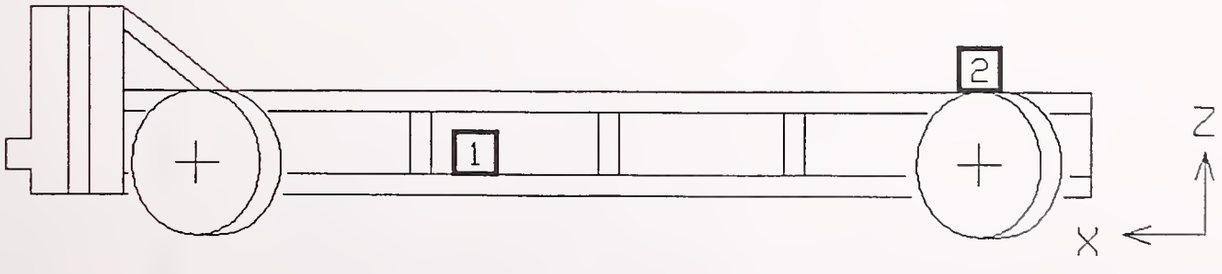
REFERENCE: X: + REARWARD FROM FRONT BUMPER
Y: + RIGHTWARD FROM VEHICLE CENTERLINE
Z: + UPWARD FROM GROUND LEVEL

[1] See DATA ACQUISITION EXPLANATIONS

Figure 3 Moving Deformable Barrier Accelerometer Placement



TOP VIEW



SIDE VIEW

Table 5 Moving Deformable Barrier Accelerometer Locations and Data Summary

TEST NUMBER: 950516 No. LOCATION	X	Y	Z	POSITIVE DIRECTION		NEGATIVE DIRECTION	
1 CENTER OF GRAVITY	2273 in	0.0 in	325 in				
LONGITUDINAL[1]				15.6 g	@ 34.5 ms	0.4 g	@ 0.0 ms
LATERAL[1]				0.9 g	@ 63.0 ms	7.9 g	@ 21.6 ms
VERTICAL[1]				4.0 g	@ 31.2 ms	2.4 g	@ 51.0 ms
RESULTANT[1]				17.0 g	@ 34.2 ms		
2 LEFT FRAME RAIL OVER REAR AXLE	3729 in	-640 in	622 in				
LONGITUDINAL[1]				21.1 g	@ 25.1 ms	0.5 g	@ 80.0 ms
LATERAL[1]				4.4 g	@ 20.0 ms	3.1 g	@ 80.0 ms

REFERENCE: X: REARWARD FROM FRONT OF VEHICLE
Y: RIGHTWARD FROM VEHICLE CENTERLINE
Z: UPWARD FROM GROUND LEVEL

[1] See DATA ACQUISITION EXPLANATIONS

Data Acquisition Explanations

The left front sill Y-axis accelerometer, LFSYG1, lost data at 10 milliseconds as a result of the accelerometer's cable being damaged by the vehicle's crush on impact.

The following moving deformable barrier channels lost data at approximatley 90 milliseconds as a result of the multiplexing box of the data acquisition system not being attached to the barrier. The box moved on impact breaking the accelerometer cables. The data loss also affected the barrier center of gravity resultant acceleration calculation.

BCGXG - moving barrier center of gravity X-axis accelerometer
BCGYG - moving barrier center of gravity Y-axis accelerometer
BCGZG - moving barrier center of gravity Z-axis accelerometer
BSRXG - moving barrier left rear frame rail X-axis accelerometer
BSRYG - moving barrier left rear frame rail Y-axis accelerometer

Section 3.0

FMVSS 214 Data

Table 6 Dummy Data Summary

TEST NUMBER: 950516 DRIVER DUMMY SERIAL NUMBER: 199

	POSITIVE DIRECTION		NEGATIVE DIRECTION	
LOWER SPINE				
LATERAL (P)	70.1 g	@ 28.1 ms	11.8 g	@ 76.9 ms
LATERAL (R)	71.2 g	@ 28.1 ms	11.5 g	@ 76.9 ms
LEFT UPPER RIB				
LATERAL (P)	54.1 g	@ 23.1 ms	9.5 g	@ 91.2 ms
LATERAL (R)	55.8 g	@ 23.1 ms	9.9 g	@ 72.5 ms
LEFT LOWER RIB				
LATERAL (P)	57.5 g	@ 34.4 ms	9.9 g	@ 71.3 ms
LATERAL (R)	55.5 g	@ 34.4 ms	10.1 g	@ 71.3 ms
	TTI (P) 63.8			
	TTI (R) 63.5			
PELVIS				
LATERAL (P)	77.5 g	@ 30.0 ms	11.3 g	@ 51.3 ms
LATERAL (R)	82.3 g	@ 30.6 ms	14.3 g	@ 50.6 ms

POSITIVE DIRECTION		NEGATIVE DIRECTION	
LONGITUDINAL:	REARWARD	LONGITUDINAL:	FORWARD
LATERAL:	RIGHTWARD	LATERAL:	LEFTWARD
VERTICAL:	UPWARD	VERTICAL:	DOWNWARD

Table 6 Dummy Data Summary, Cont'd.

TEST NUMBER: 950516 PASSENGER DUMMY SERIAL NUMBER: 191

	POSITIVE DIRECTION		NEGATIVE DIRECTION	
LOWER SPINE				
LATERAL (P)	73.1 g	@ 39.4 ms	24.2 g	@ 69.4 ms
LATERAL (R)	72.2 g	@ 39.4 ms	24.2 g	@ 69.4 ms
LEFT UPPER RIB				
LATERAL (P)	75.8 g	@ 36.9 ms	7.5 g	@ 76.3 ms
LATERAL (R)	75.1 g	@ 36.9 ms	8.1 g	@ 76.3 ms
LEFT LOWER RIB				
LATERAL (P)	106.2 g	@ 37.5 ms	32.5 g	@ 64.4 ms
LATERAL (R)	105.6 g	@ 37.5 ms	32.5 g	@ 64.4 ms
	TTI (P) 89.7			
	TTI (R) 88.9			
PELVIS				
LATERAL (P)	83.6 g	@ 35.6 ms	14.4 g	@ 80.6 ms
LATERAL (R)	85.5 g	@ 33.7 ms	14.4 g	@ 80.6 ms

POSITIVE DIRECTION	
LONGITUDINAL:	REARWARD
LATERAL:	RIGHTWARD
VERTICAL:	UPWARD

NEGATIVE DIRECTION	
LONGITUDINAL:	FORWARD
LATERAL:	LEFTWARD
VERTICAL:	DOWNWARD

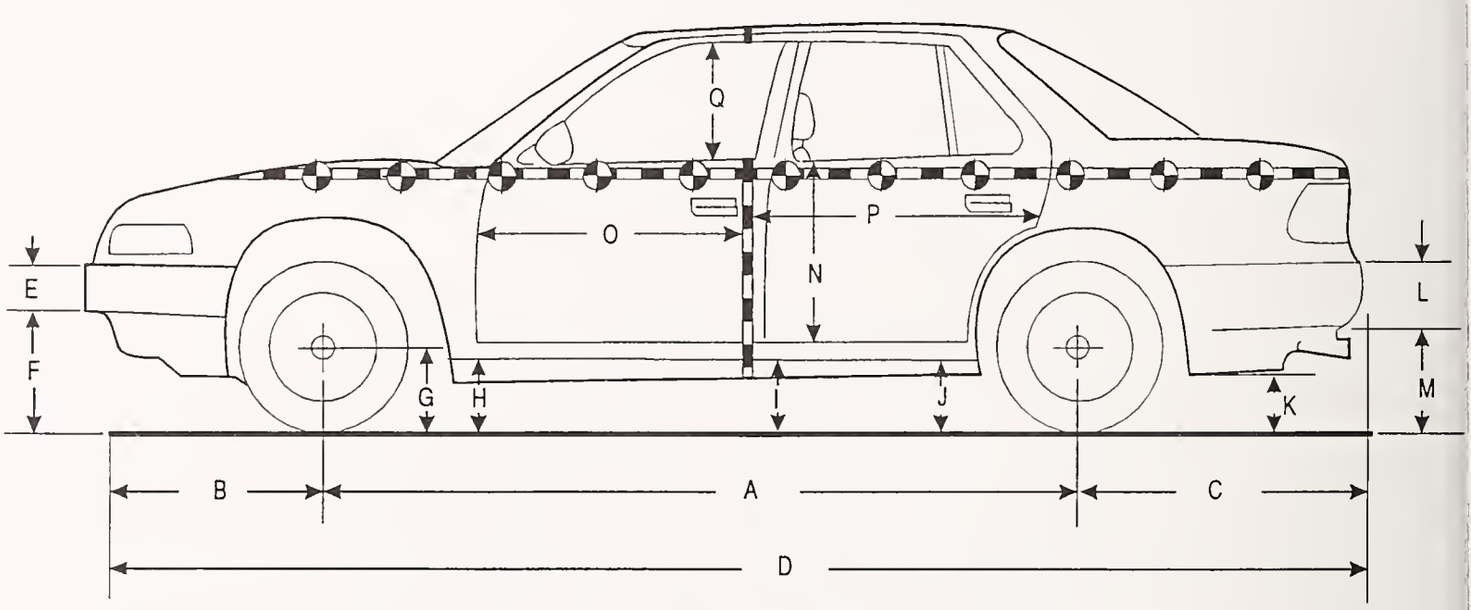
Section 4.0

Vehicle, Occupant, Moving Deformable Barrier, and Camera Measurements

Figure 4 Pre-Test and Post-Test Measurements

Vehicle: 1995 Solectria Force 4-door sedan

Test Date: 05/16/95 VIN: 2C1MR52X6756913



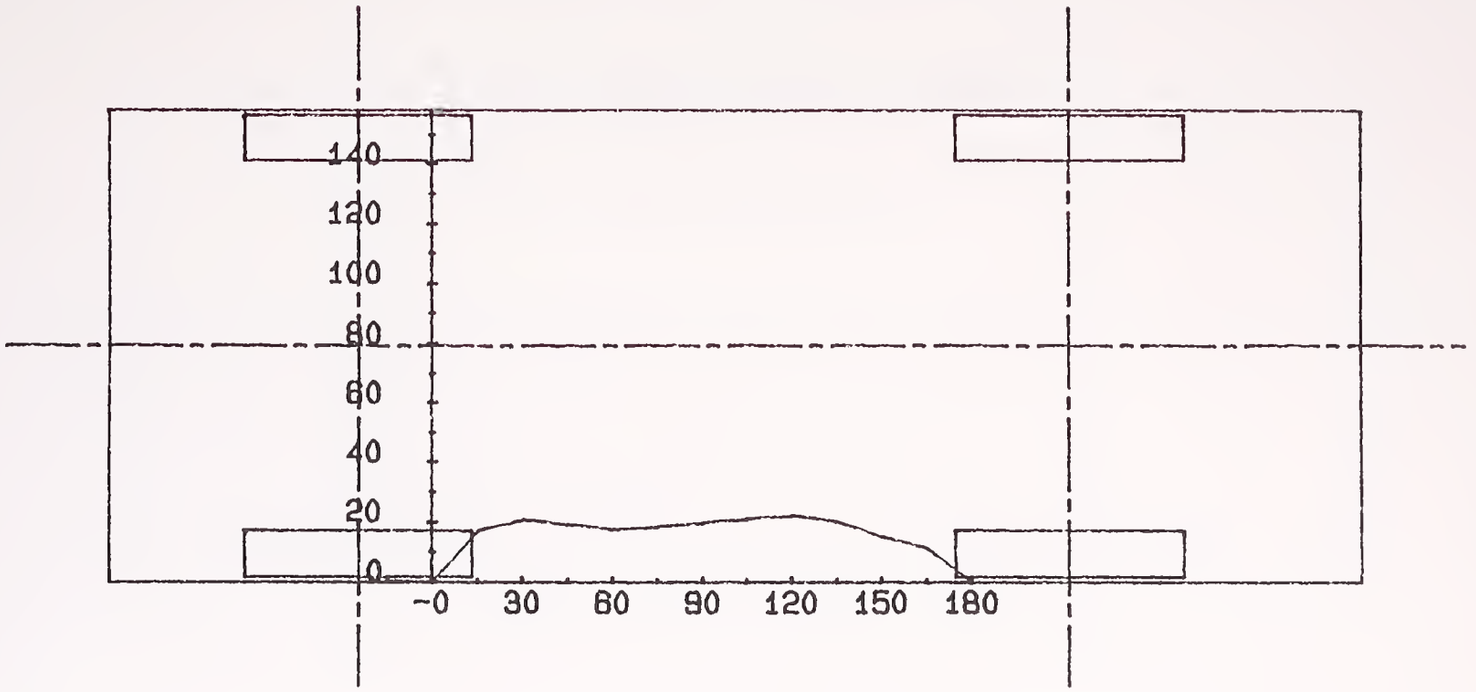
LEFT SIDE VIEW

	Delivered	Post-Test	Change		Delivered	Post-Test	Change
A	2362	2295	67	J	234	211	23
B	832	840	-8	K	276	268	8
C	973	985	-12	L	90	90	0
D	4176	4120	56	M	535	286	249
E	105	105	0	N	630	578	52
F	466	230	236	NA	635	629	6
G	273	273	0	P	1376	1280	96
H	245	249	-4	Q	413	374	39
I	218	153	65				

All distance measurements are in millimeters.

Figure 5

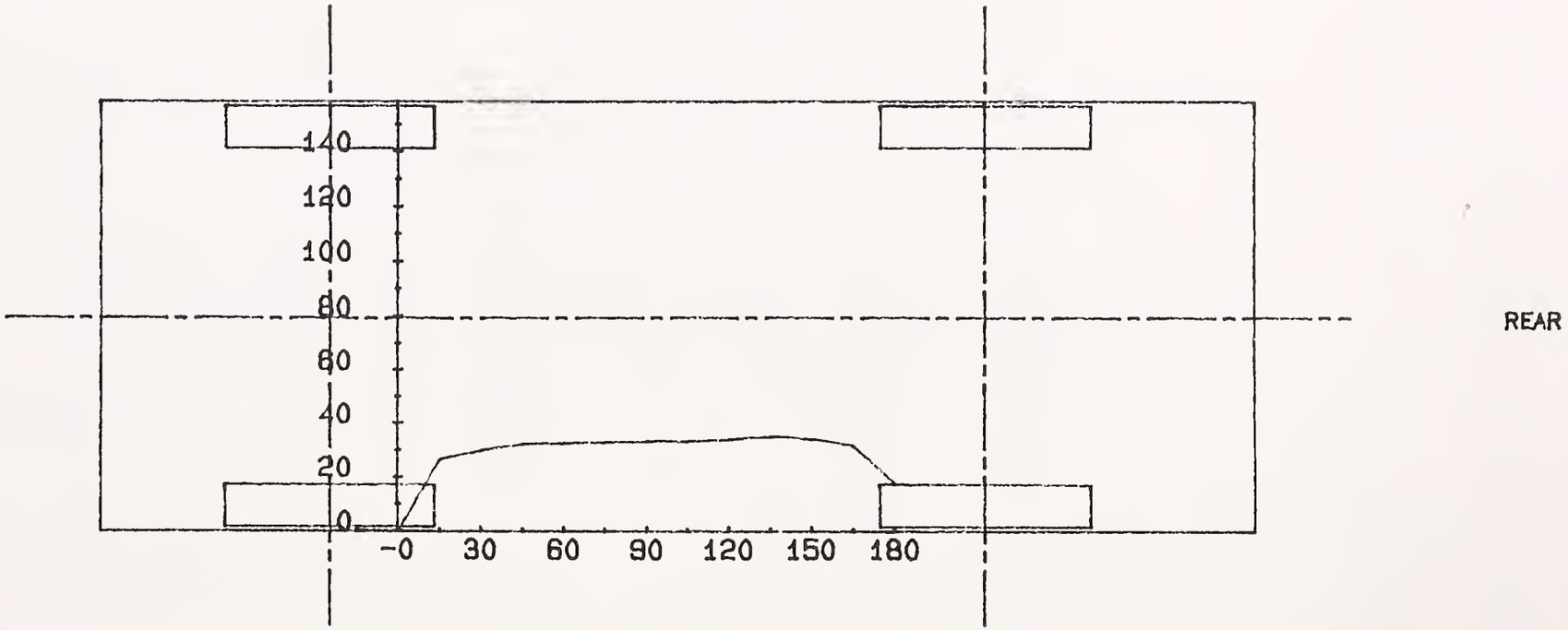
VEHICLE EXTERIOR STATIC CRUSH PROFILE



PROFILE LEVEL EQUALS AXLE HEIGHT WHICH IS 29.7 CM. ABOVE GROUND LEVEL
(0,0) EQUALS PROJECTED IMPACT POINT

Figure 5, Cont'd.

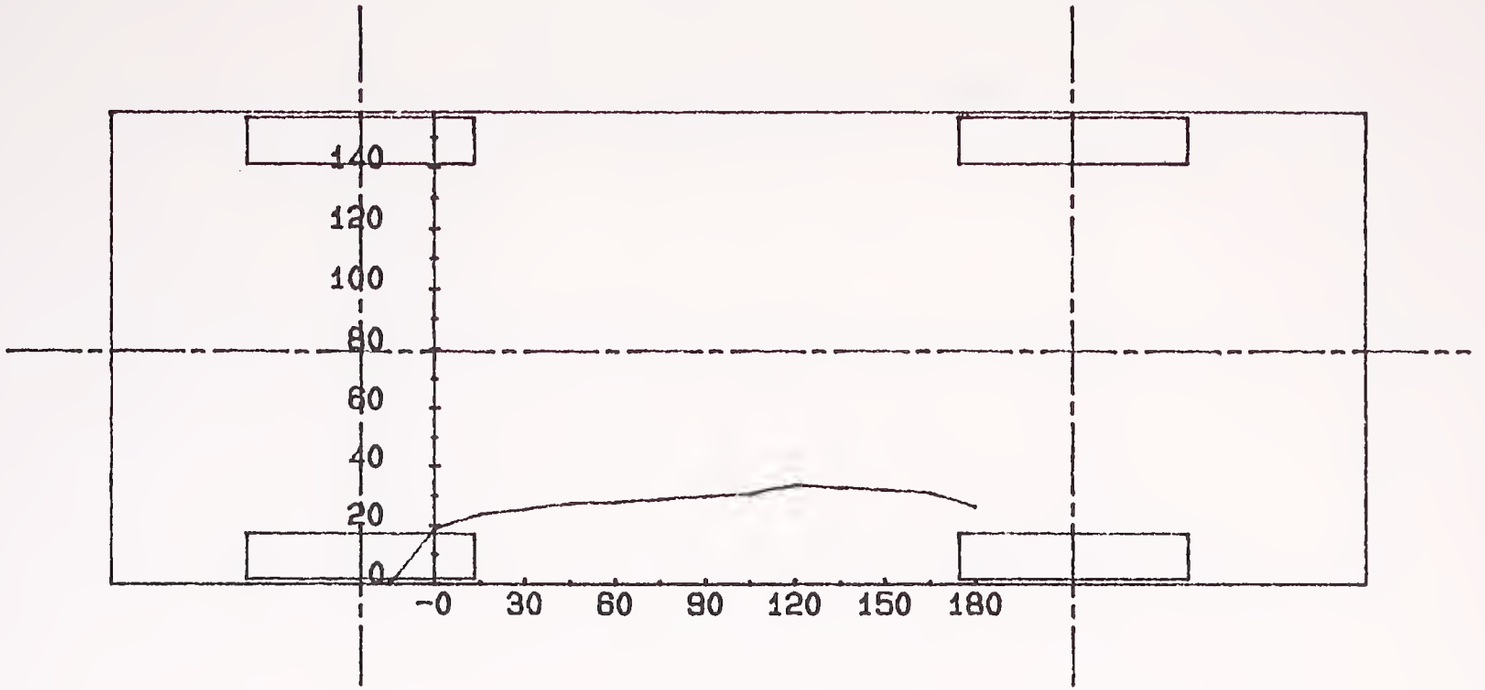
VEHICLE EXTERIOR STATIC CRUSH PROFILE



PROFILE LEVEL EQUALS H-POINT HEIGHT WHICH IS 48.2 CM. ABOVE GROUND LEVEL
(0,0) EQUALS PROJECTED IMPACT POINT

Figure 5, Cont'd.

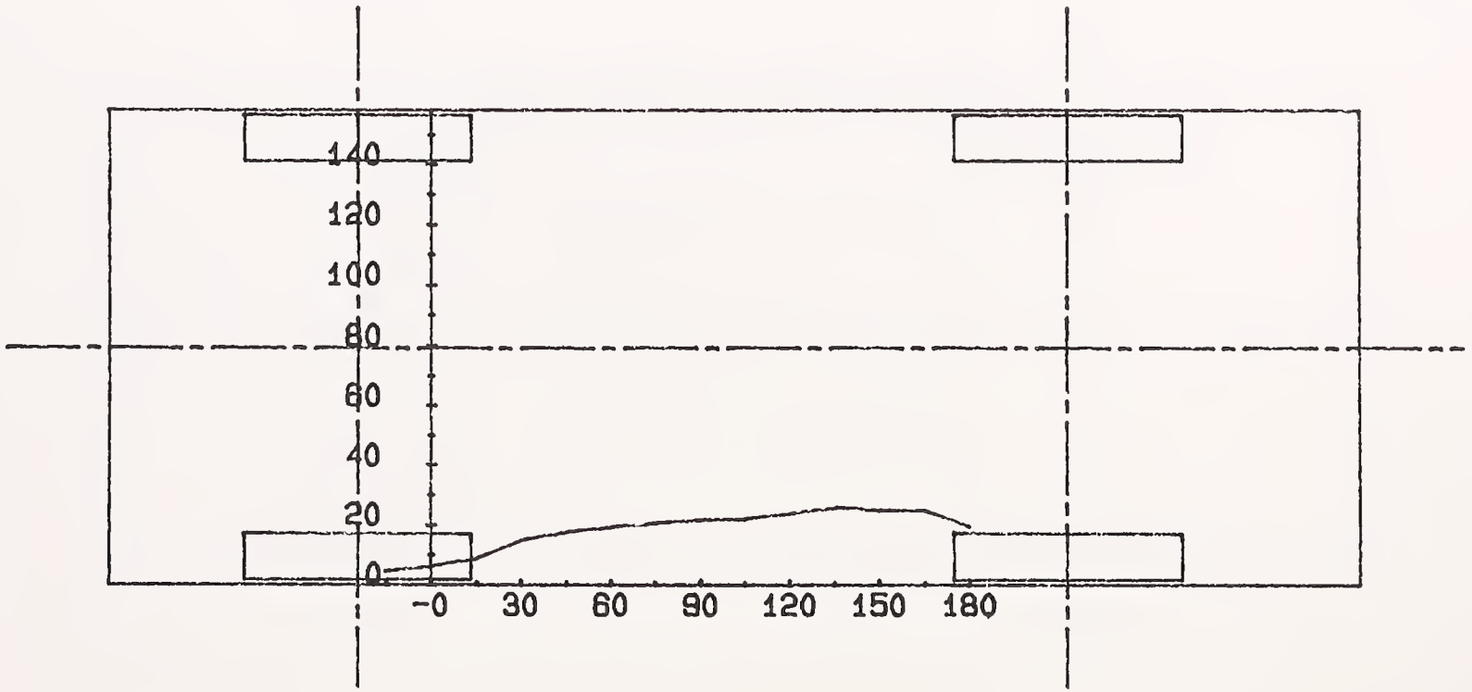
VEHICLE EXTERIOR STATIC CRUSH PROFILE



PROFILE LEVEL EQUALS MID DOOR HEIGHT WHICH IS 60.1 CM. ABOVE GROUND LEVEL.
(0,0) EQUALS PROJECTED IMPACT POINT

Figure 5, Cont'd.

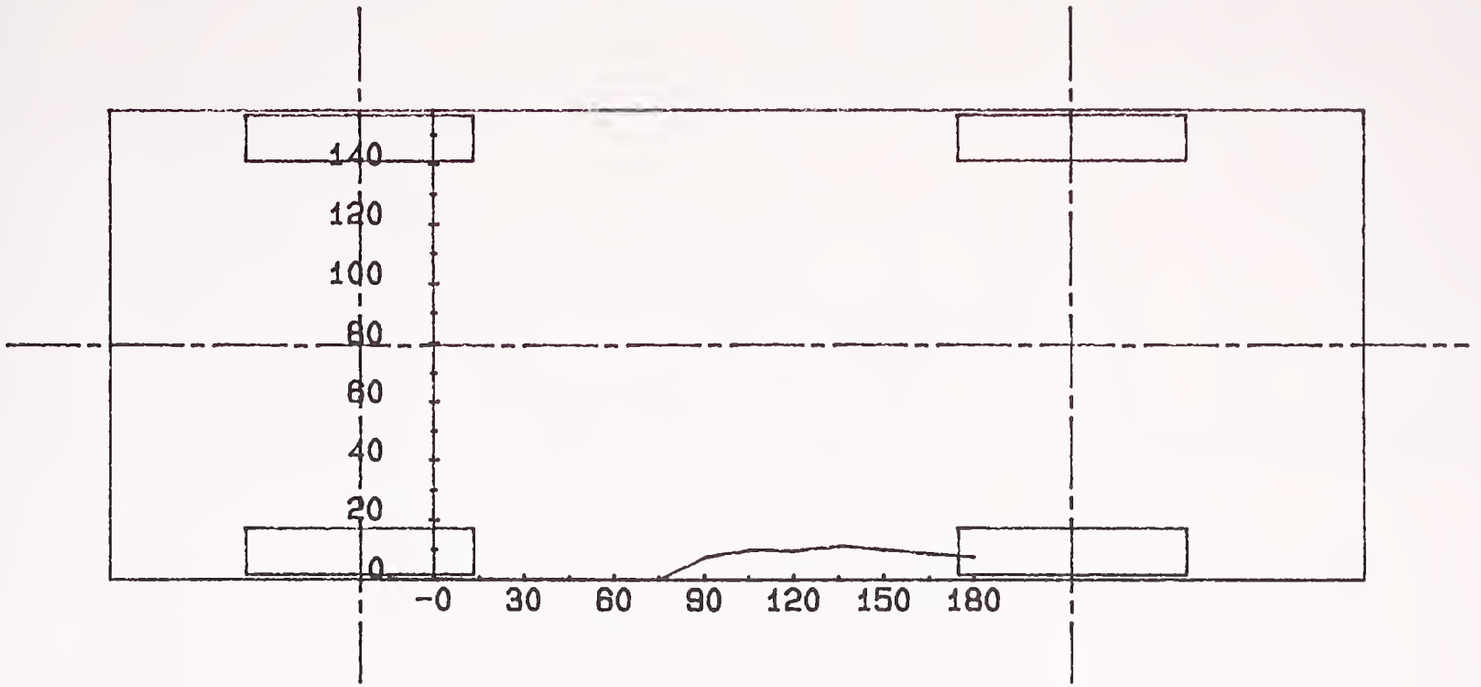
VEHICLE EXTERIOR STATIC CRUSH PROFILE



PROFILE LEVEL EQUALS WINDOW SILL HEIGHT WHICH IS 86.3 CM. ABOVE GROUND LEVEL
(0,0) EQUALS PROJECTED IMPACT POINT

Figure 5, Cont'd.

VEHICLE EXTERIOR STATIC CRUSH PROFILE



PROFILE LEVEL EQUALS WINDOW TOP HEIGHT WHICH IS 133.6 CM. ABOVE GROUND LEVEL
(0,0) EQUALS PROJECTED IMPACT POINT

TEST NO. 950516

TABLE 7 VEHICLE EXTERIOR PROFILES AND STATIC CRUSH
ZERO DISTANCE AT PROJECTED IMPACT POINT[1]

LOCATION	HEIGHT (mm)	-150	0	150	300	450	600	750	900	1050	1200	1350	1500	1650	1800
		PRE-TEST PROFILE (DISTANCE IN MILLIMETERS FROM REFERENCE PLANE[2])													
AXLE HEIGHT	297	0	0	472	478	484	488	490	488	489	490	487	481	476	0
H-POINT	482	0	0	439	440	441	441	441	438	439	439	438	439	438	441
MID DOOR	601	0	427	432	436	434	437	438	432	432	431	430	431	431	432
WINDOW SILL	863	524	509	500	490	484	484	484	474	473	469	466	467	466	466
WINDOW TOP	1336	0	0	0	0	0	0	0	718	715	717	721	725	729	736
LOCATION	**HEIGHT (mm)**	**POST-TEST PROFILE (DISTANCE IN MILLIMETERS FROM REFERENCE PLANE[2])**													
AXLE HEIGHT	297	0	0	641	683	674	658	671	684	698	710	685	629	587	0
H-POINT	482	0	0	702	737	761	764	768	769	770	775	784	777	753	615
MID DOOR	601	0	613	666	688	706	714	724	727	735	764	753	747	737	692
WINDOW SILL	863	567	568	586	638	659	676	689	688	693	706	722	712	712	658
WINDOW TOP	1336	0	0	0	0	0	0	0	791	811	812	833	821	814	809
LOCATION	**HEIGHT (mm)**	**STATIC CRUSH (mm)**													
AXLE HEIGHT	297	0	0	169	205	190	170	181	196	209	220	198	148	111	0
H-POINT	482	0	0	263	297	320	323	327	331	331	336	346	338	315	174
MID DOOR	601	0	186	234	252	272	277	286	295	303	333	323	316	306	260
WINDOW SILL	863	43	59	86	148	175	192	205	214	220	237	256	245	246	192
WINDOW TOP	1336	0	0	0	0	0	0	0	73	96	95	112	96	85	73

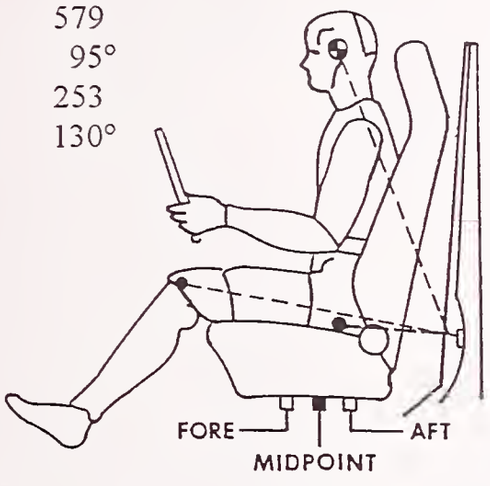
Column readings are front to rear from left to right.
All measurements are in millimeters.
[1]Projected impact point is 940 mm forward of driver's side wheelbase midpoint.
[2]Reference plane is parallel to and 1200 mm from the vehicle's longitudinal centerline

Figure 6 Dummy and Seat Positioning Data

Vehicle:	1995 Solectria Force
Seat Type:	Front - Bucket; Rear - Bench
Adjuster Type:	Manual
Bucket Seat Back type:	Manually adjustable
Technicians:	D. Summers, S. Orts
Positioning Date:	05/16/95
Ambient Temperature:	22° C
Time:	1230

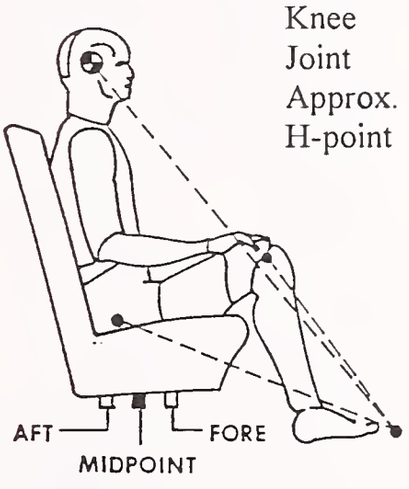
Driver Dummy[1] #199; Type: SID

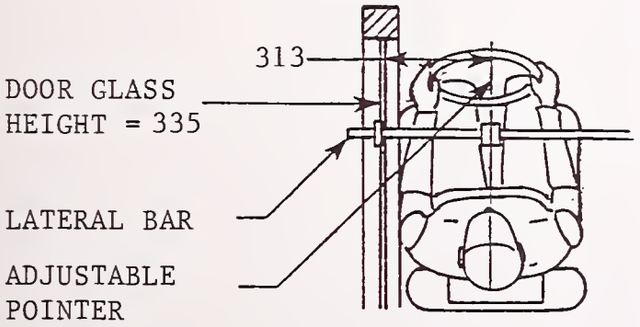
Head	471
Target	-50°
Knee	579
Joint	95°
Approx.	253
H-point	130°

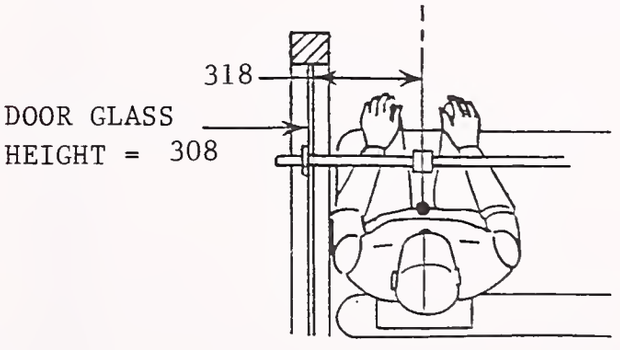


Left Rear
Passenger Dummy[2] #191; Type: SID

Head	399
Target	-22°
Knee	702
Joint	99°
Approx.	430
H-point	127°



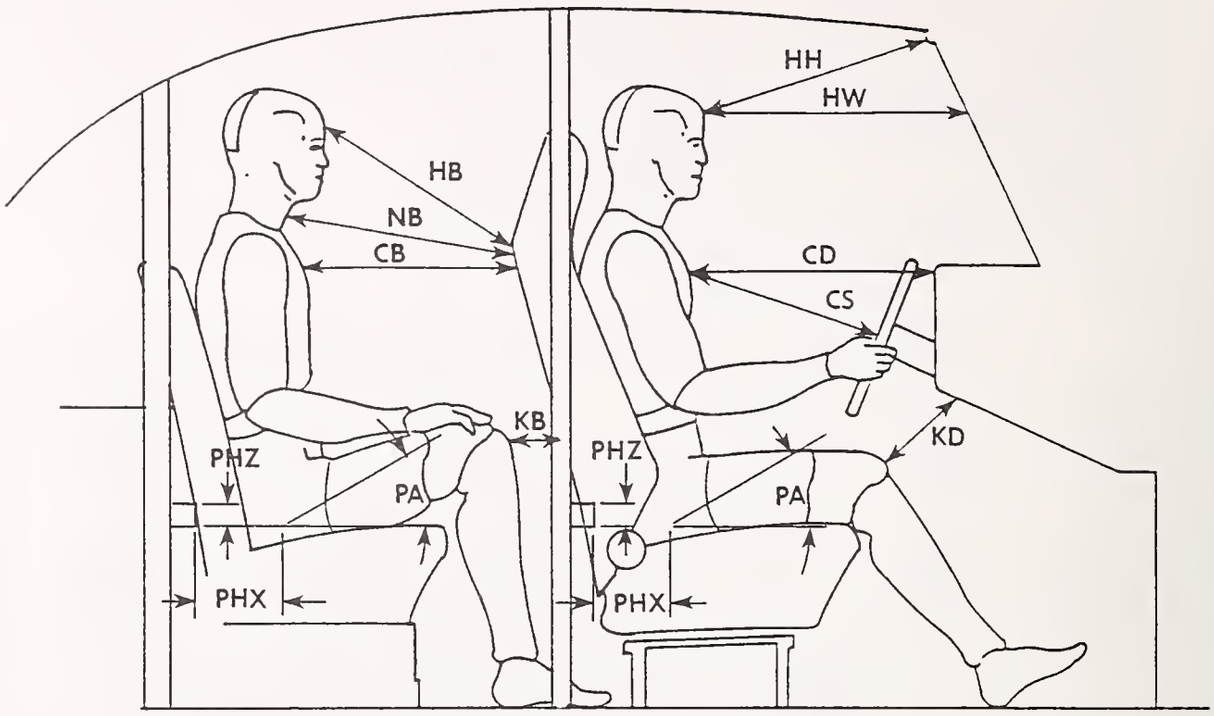




[1] Driver dummy measurements are referenced to top of front door striker.
[2] Passenger dummy measurements are referenced to top of rear door striker.

All distance measurements are in millimeters.
All angles are referenced to vertical.

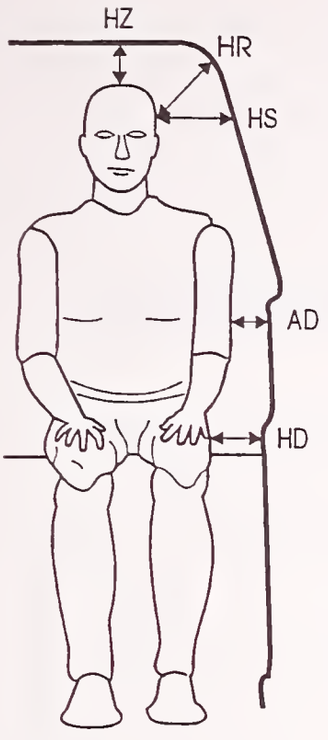
Figure 7 Dummy Longitudinal Clearance Measurements

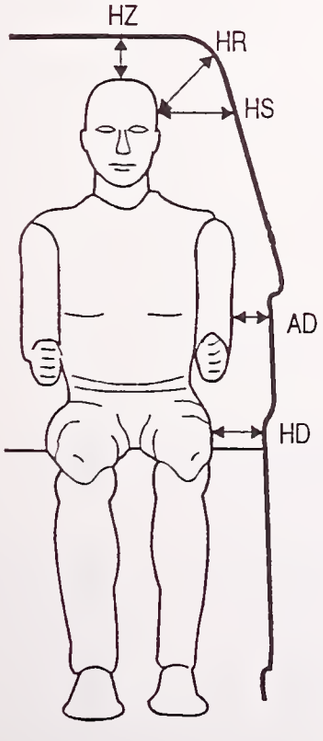


	Driver	Left Rear Passenger
HH	430	NA
HW	603	NA
CD	552	NA
CS	375	NA
KDL	102	NA
KDR	101	NA
PA	23°	24°
PHX	203	324
PHZ	144	310
HB	NA	520
NB	NA	NA
CB	NA	454
KBL	NA	96
KBR	NA	92

Note: The rear passenger's PHX and PHZ measurements are referenced to the front door striker.
All distance measurements are in millimeters.
All angles are referenced to horizontal.

Figure 8 Dummy Lateral Clearance Measurements

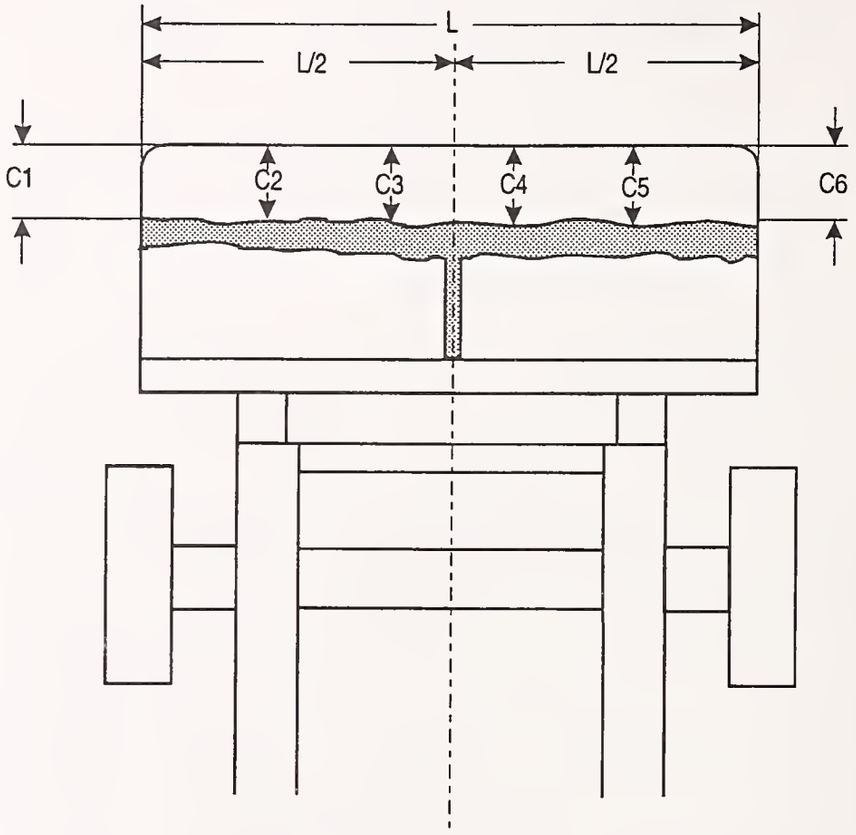




	Driver	Left Rear Passenger
HR	163	133
HS	227	160
AD	93	104
HD	105	134
HZ	146	56

All distance measurements are in millimeters.

Figure 9 Moving Deformable Barrier Face Crush



NOTES: L is pre-test length of contact surface.
C1 through C6 are spaced equally apart.
CL moving barrier centerline.

	Pre-test	Post-test	Crush
L	1630 mm		
C1	250 mm	316 mm	66 mm
C2	226 mm	259 mm	33 mm
C3	224 mm	249 mm	25 mm
C4	226 mm	254 mm	28 mm
C5	224 mm	259 mm	35 mm
C6	239 mm	239 mm	0 mm
CL	229 mm	251 mm	22 mm

Table 8 Moving Deformable Barrier Face Static Crush

Location	Height	32	28	24	20	16	12	8	4	0	4	8	12	16	20	24	28	32
		Zero distance at barrier centerline[1]																
		Pre-test profile (distance in millimeters from reference plane[2])																
Top of face	813	333	328	333	328	328	328	325	330	330	328	328	325	325	325	325	325	325
Mid-face	559	333	328	333	328	328	328	325	328	330	328	328	325	325	325	325	325	325
Bumper	432	250	229	226	226	224	226	224	226	229	226	226	221	224	221	224	226	239
		Post-test profile (distance in millimeters from reference plane[2])																
Top of face	813	358	325	307	318	325	330	325	330	328	330	333	328	330	330	345	384	409
Mid-face	559	358	343	333	330	335	343	343	336	339	338	338	333	335	335	340	353	356
Bumper	432	315	279	259	249	257	259	254	257	251	249	250	250	250	250	259	262	254
		Static crush (mm)																
Top of face	813	25	-3	-26	-10	-3	2	0	0	-2	2	5	3	5	5	20	59	84
Mid-face	559	25	15	0	2	7	15	18	8	9	10	10	8	10	10	15	28	31
Bumper	432	65	50	33	23	33	33	30	31	22	23	24	29	26	29	35	36	15

[1] Column readings are left to right across barrier face from left to right.
[2] Reference plane is the rear surface of the deformable barrier face.
All measurements are in millimeters.

Figure 10 Camera Positions

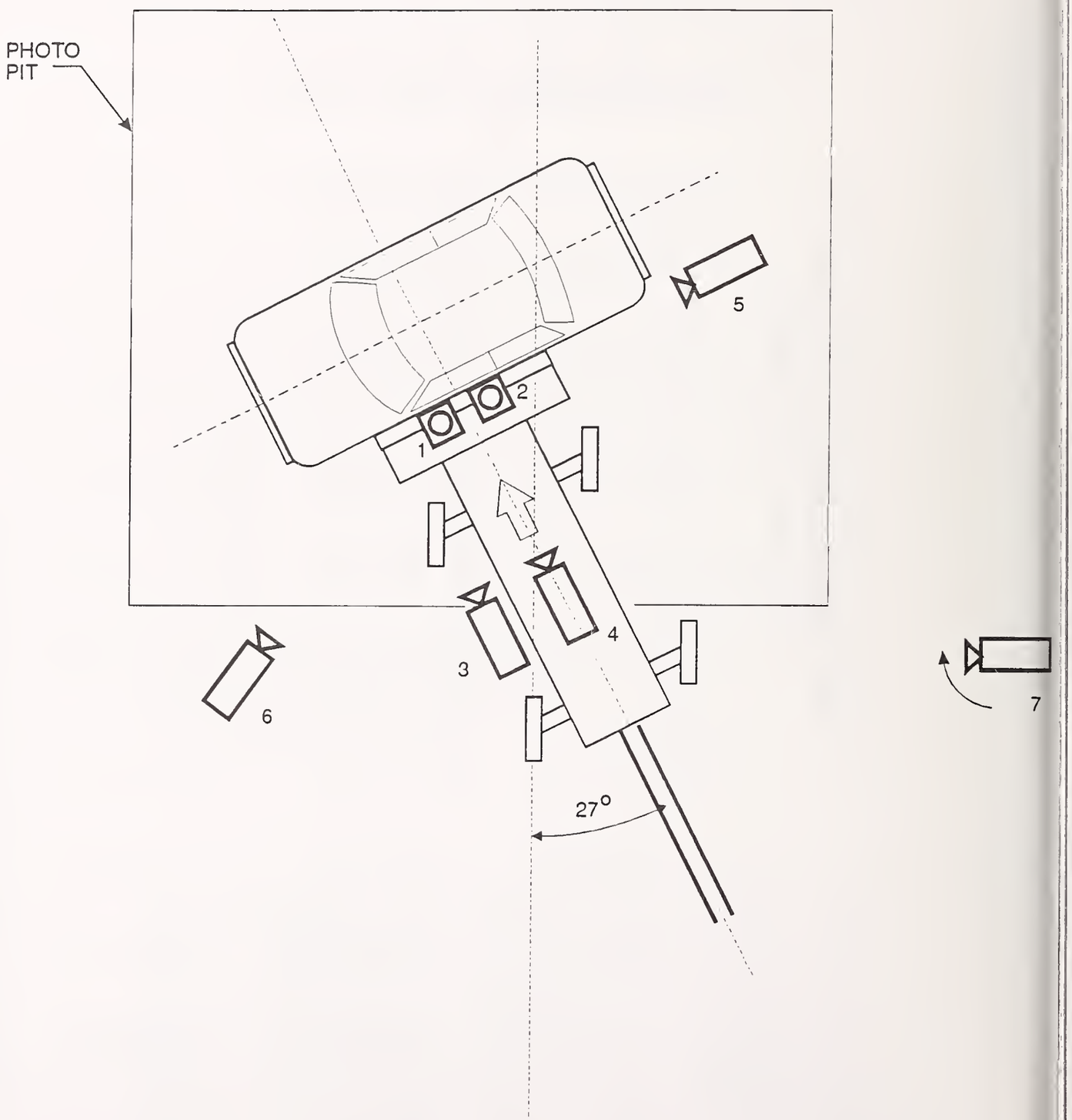


Table 9 Motion Picture Camera Locations

Vehicle year/make/model/body style: 1995/Solectria/Force/4-door sedan

Test number: 950516

Camera Number	View	Camera Positions[1] X	Y	Z	Camera Angle[2]	Lens (mm)	Film Speed (fps)	Purpose
1	Overhead wide	NA	NA	1069 cm	-90°	8.5	498	Vehicle crush
2	Overhead tight	NA	NA	1069 cm	-90°	25	500	Vehicle crush
3	Onboard barrier - side[3]	NA	NA	NA	0°	25	NA	Impact alignment
4	Onboard barrier - center[3]	NA	NA	NA	-15°	13	NA	Impact alignment
5	Right wide	-977 cm	-20 cm	87 cm	0°	13	515	Vehicle crush
6	Left wide	479 cm	-406 cm	108 cm	0°	25	505	Vehicle crush
7	Real-time panning	NA	NA	NA	NA	120	24	Vehicle Dynamics

[1] +X: Film plane forward of vehicle's impact point
+Y: Film plane to right of vehicle's impacted side
+Z: Film plane above ground level

[2] +Angle: Film plane angled upward from horizontal plane

[3] No camera timing recorded as a result of a damaged camera cable.

Appendix A

Photographs

Figure A-1 Pre-test Barrier and Vehicle Front View

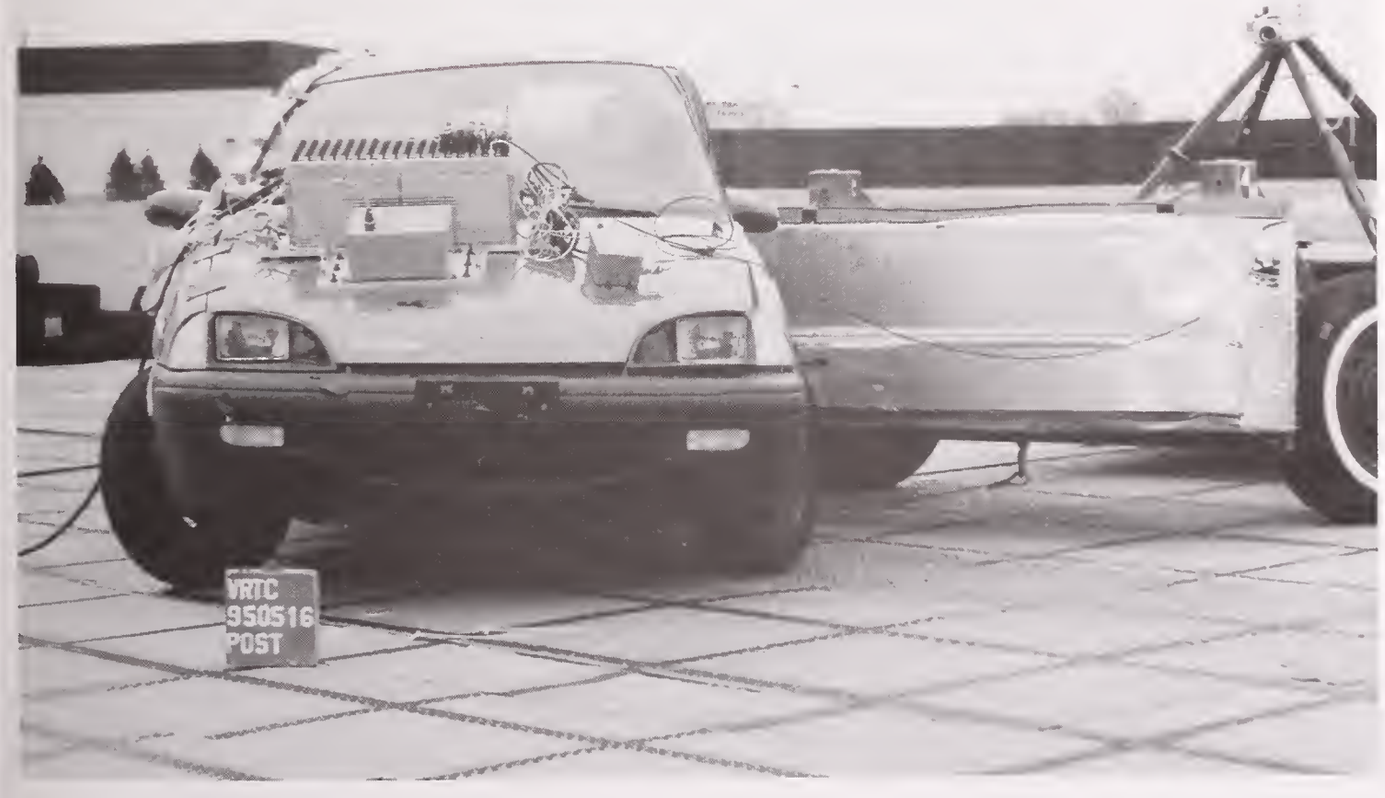


Figure A-2 Post-test Barrier and Vehicle Front View

Figure A-3 Pre-test Left Side View

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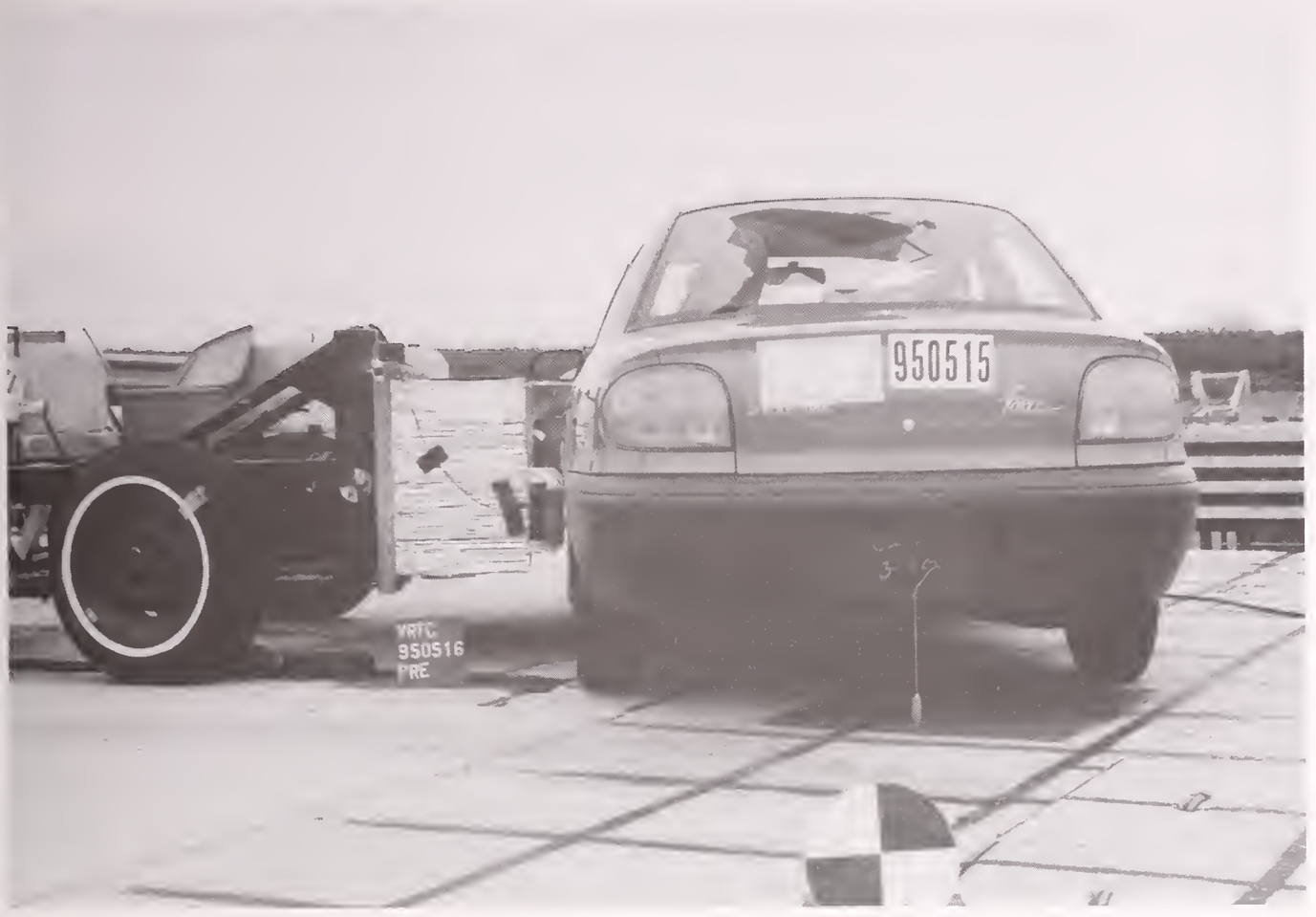

Figure A-4 Pre-test Barrier and Vehicle Rear View

Figure A-5 Post-test Barrier and Vehicle Rear View

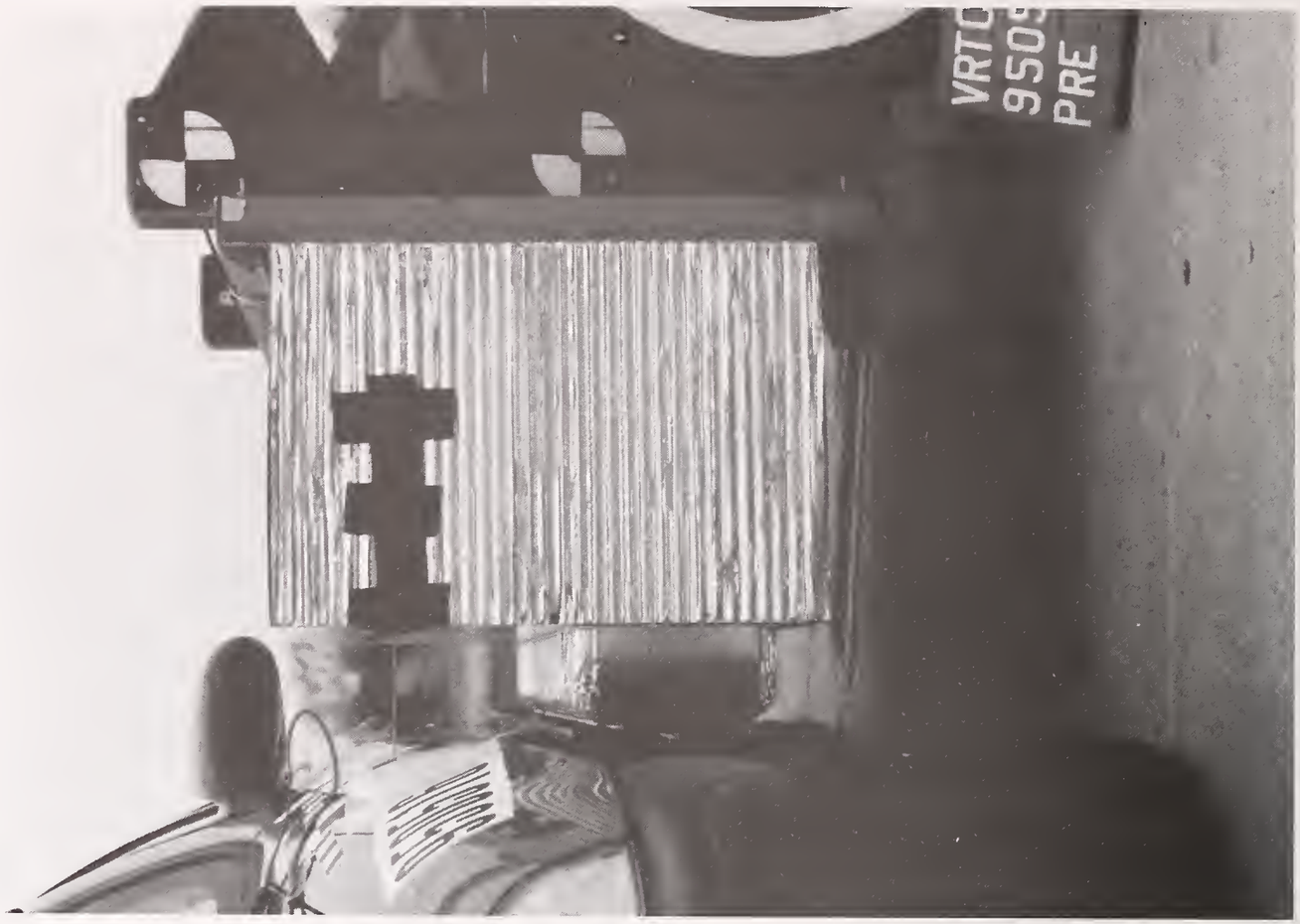

Figure A-6 Pre-test Left Front Close-up View

Figure A-7 Pre-test Left Rear Close-up View

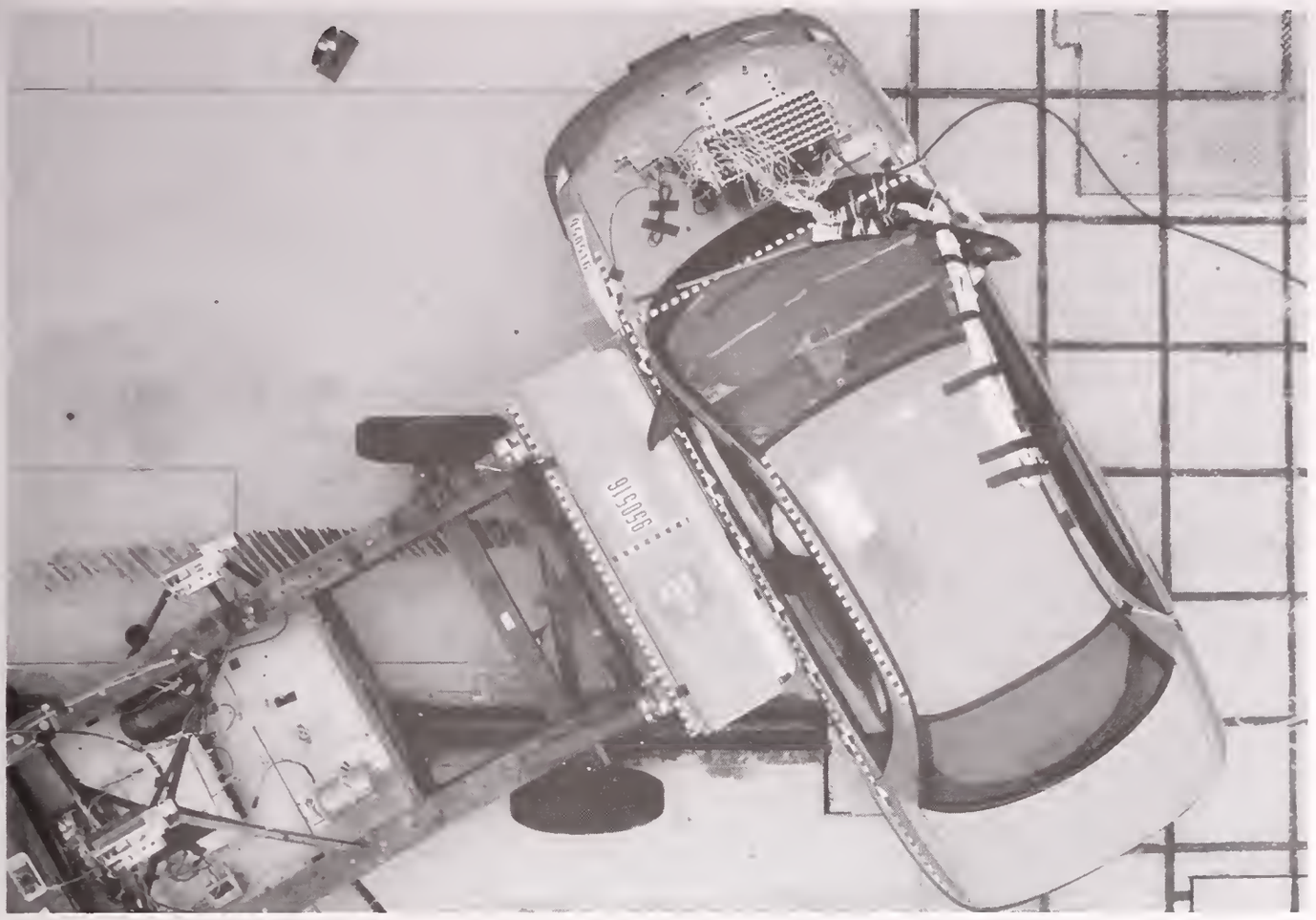

Figure A-8 Pre-test Overhead View

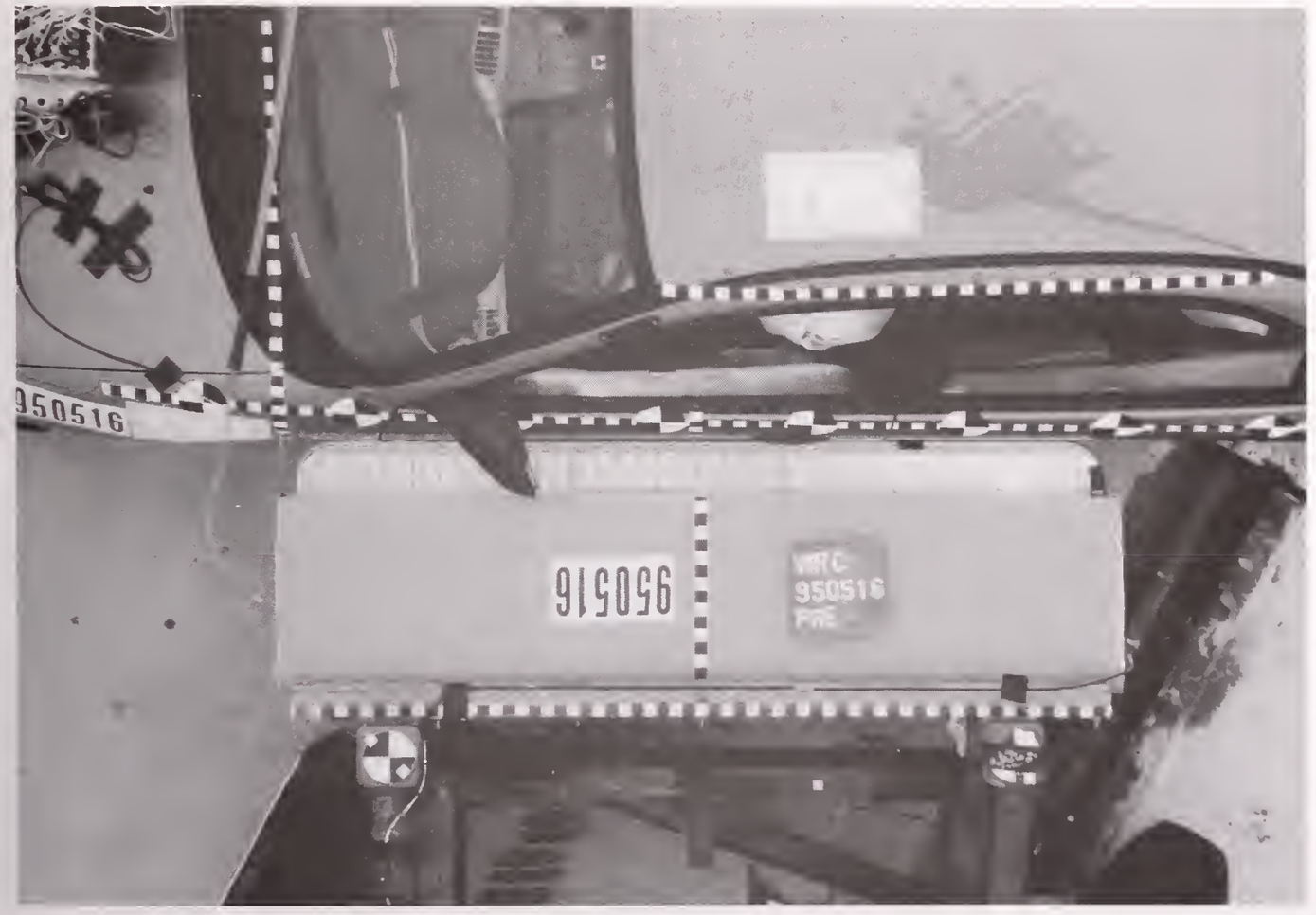

Figure A-9 Pre-test Overhead Close-up View

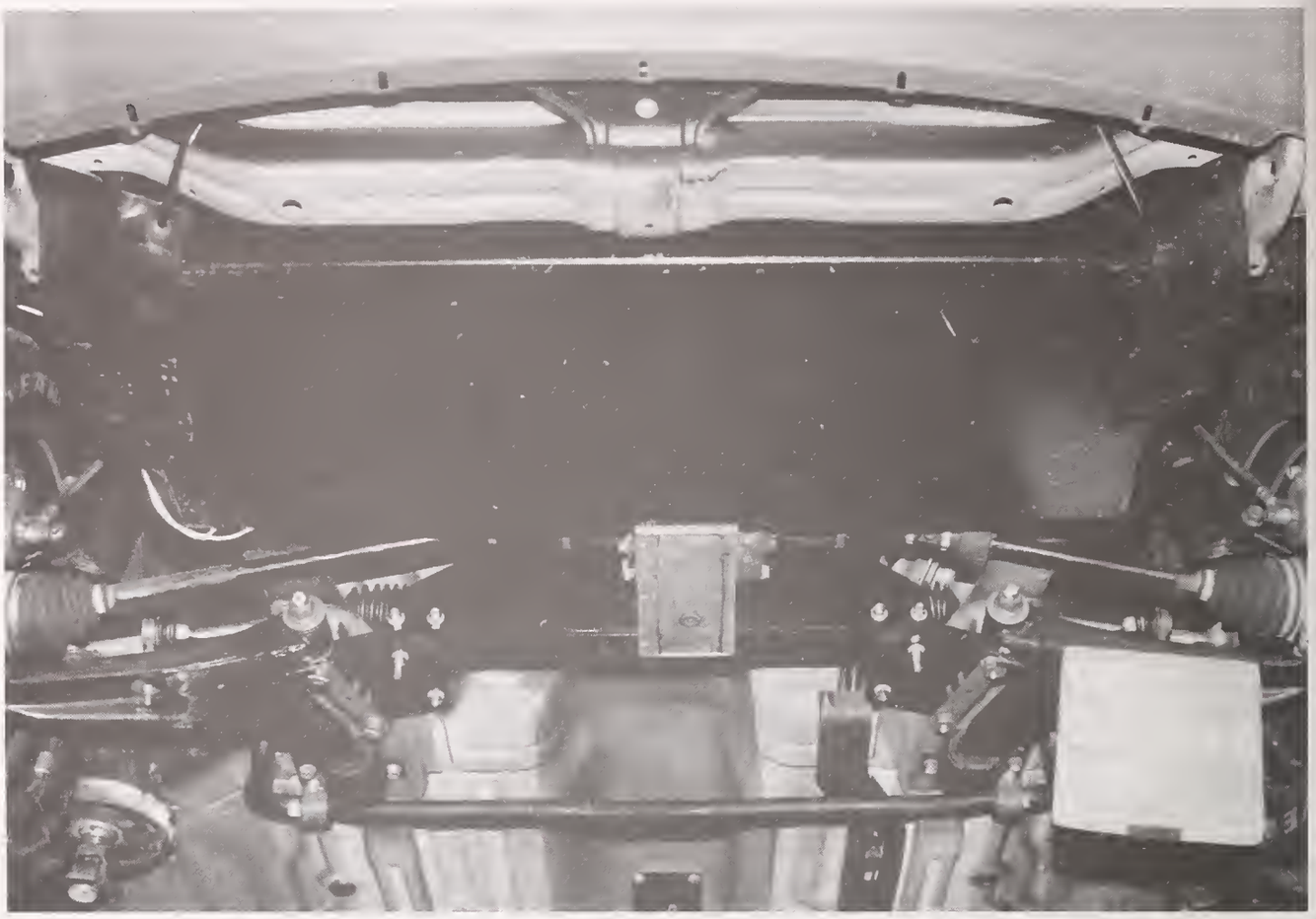

Figure A-10 Pre-test Front Underbody View

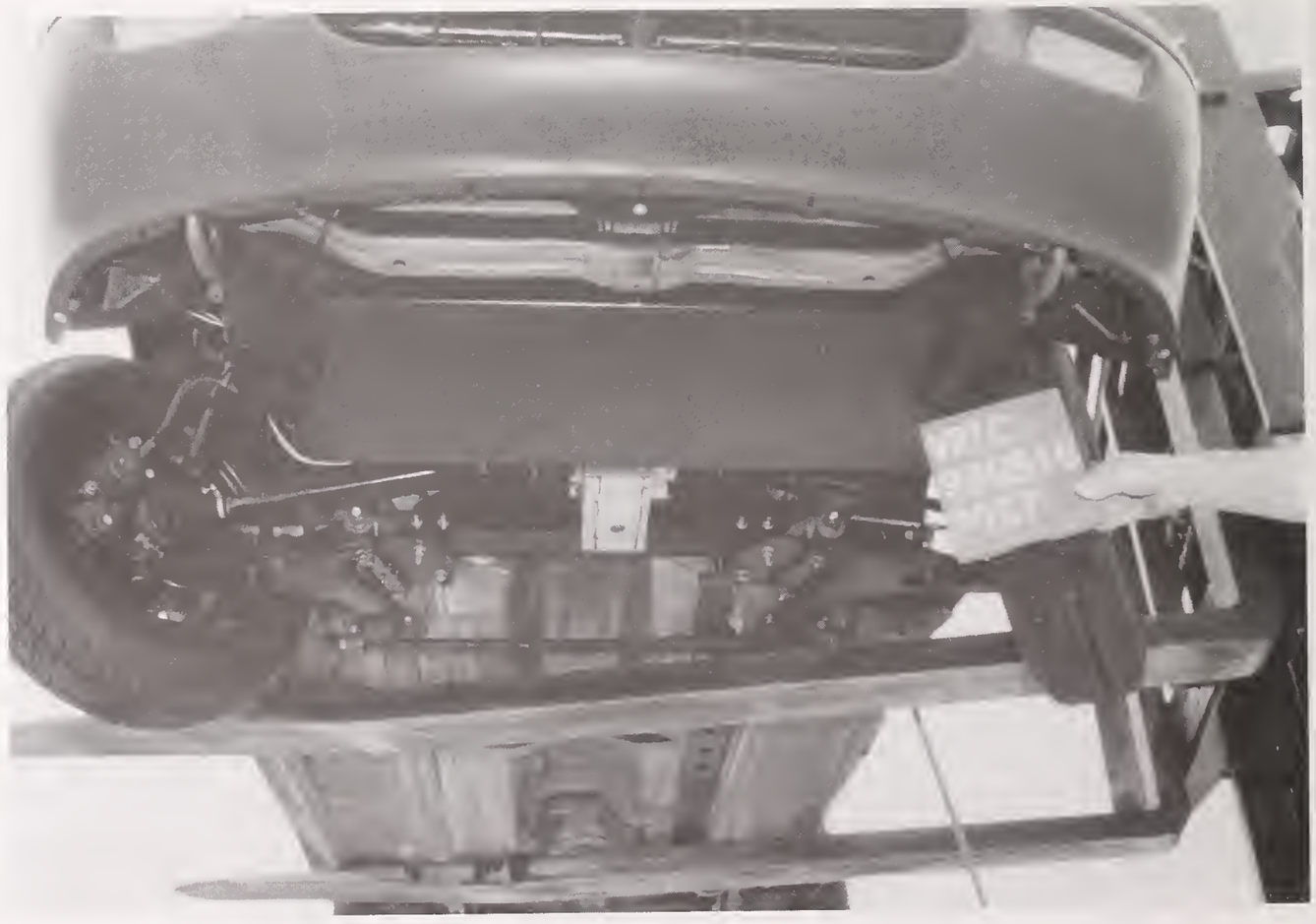

Figure A-11 Post-test Front Underbody View

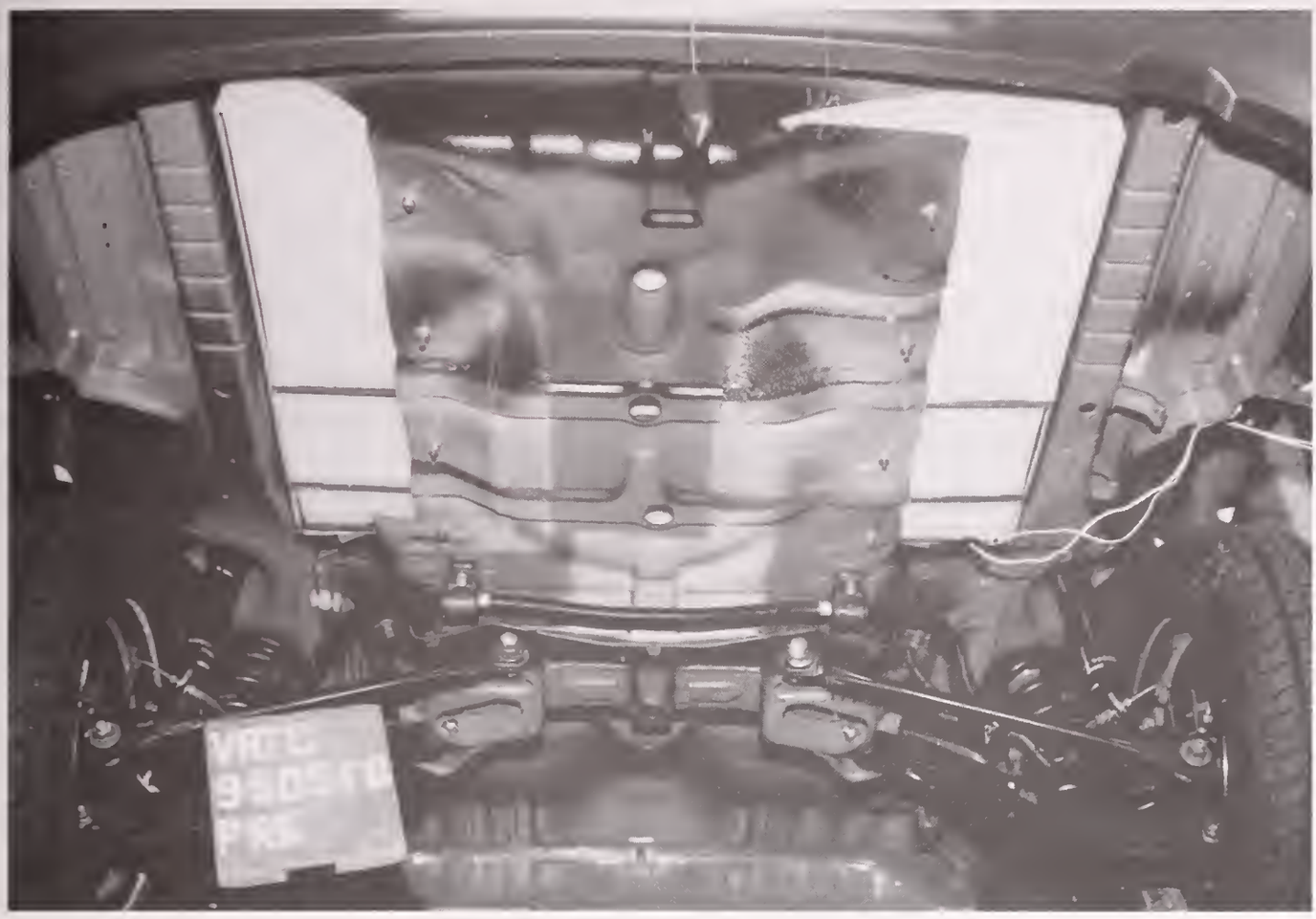

Figure A-12 Pre-test Rear Underbody View

Figure A-13 Post-test Rear Underbody View

Figure A-14 Pre-test Driver Dummy Position View

Figure A-15 Post-test Driver Dummy Position View

Figure A-16 Pre-test Driver Dummy and Vehicle Interior - View 1

Figure A-17 Pre-test Driver Dummy and Vehicle Interior - View 2

Figure A-18 Post-test Driver Dummy and Vehicle Interior View

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Figure A-19 Pre-test Passenger Dummy Position View

Figure A-20 Post-test Passenger Dummy Position View

Figure A-21 Pre-test Passenger Dummy and Vehicle Interior - View 1

Figure A-22 Pre-test Passenger Dummy and Vehicle Interior - View 2

Figure A-23 Post-test Passenger Dummy and Vehicle Interior View

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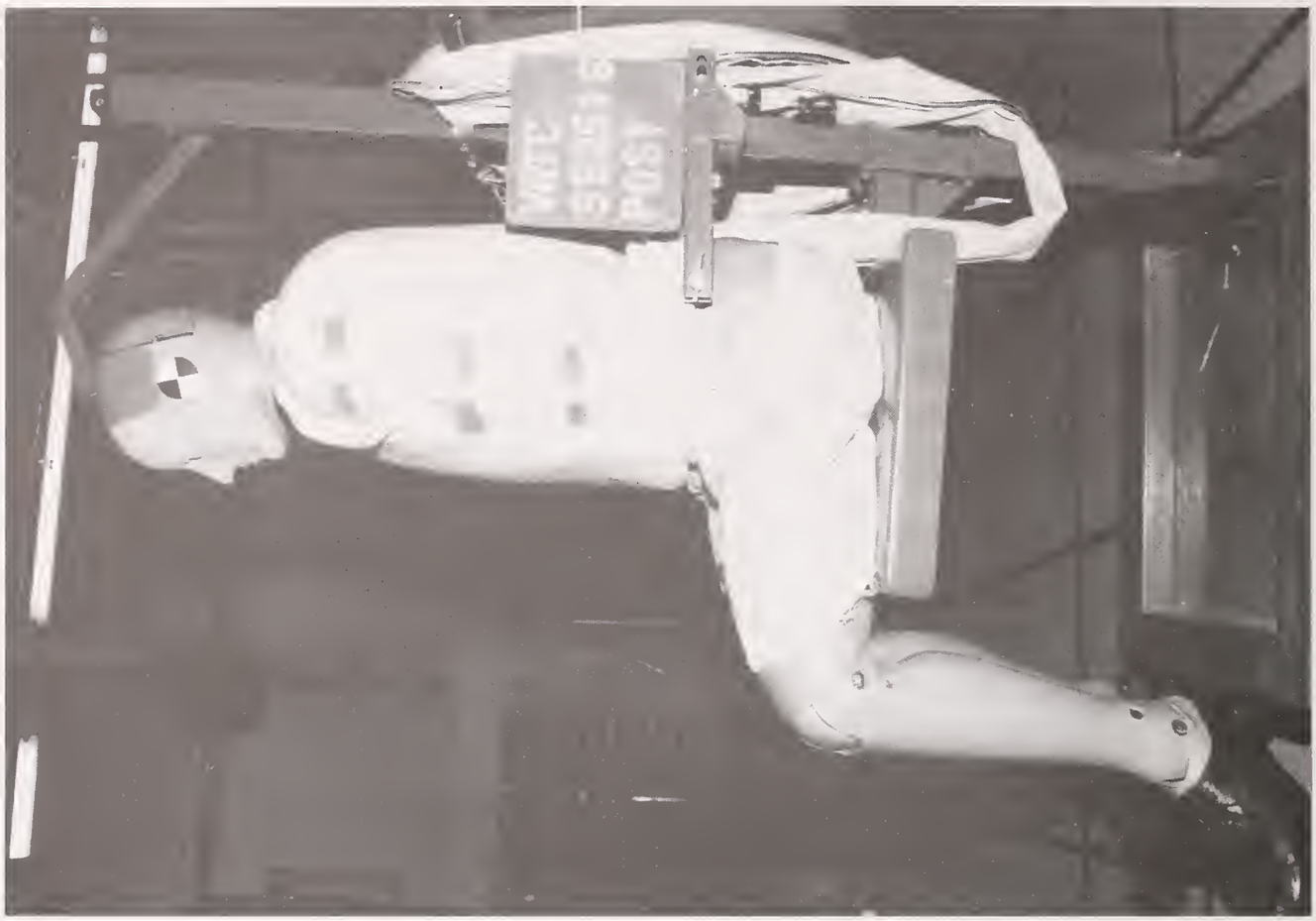

Figure A-24 Post-test Driver Dummy Contact - View 1

Figure A-25 Post-test Driver Dummy Contact - View 2

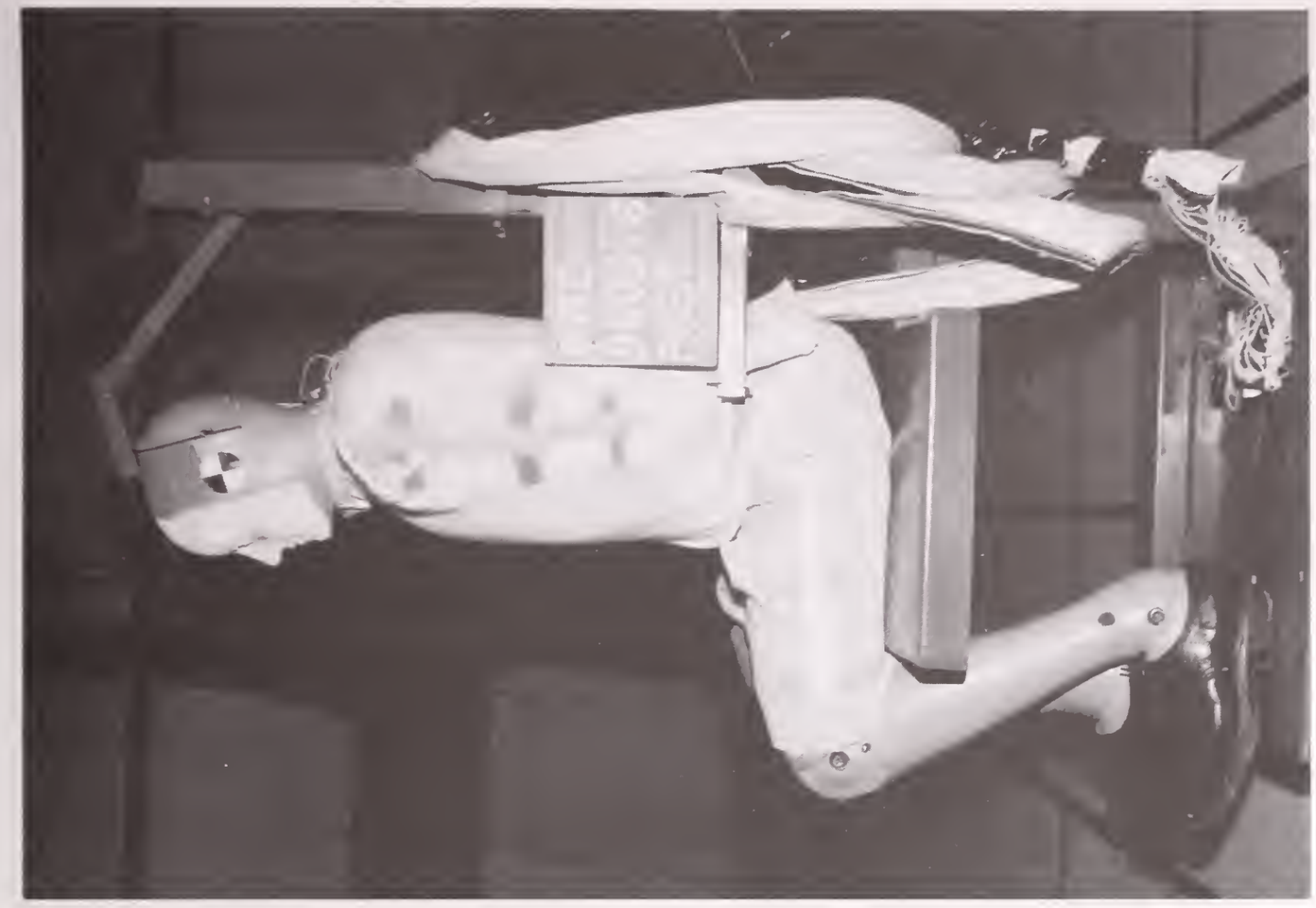

Figure A-26 Post-test Passenger Dummy Contact View

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Figure A-27 Post-test Deformable Barrier Face Right Side View

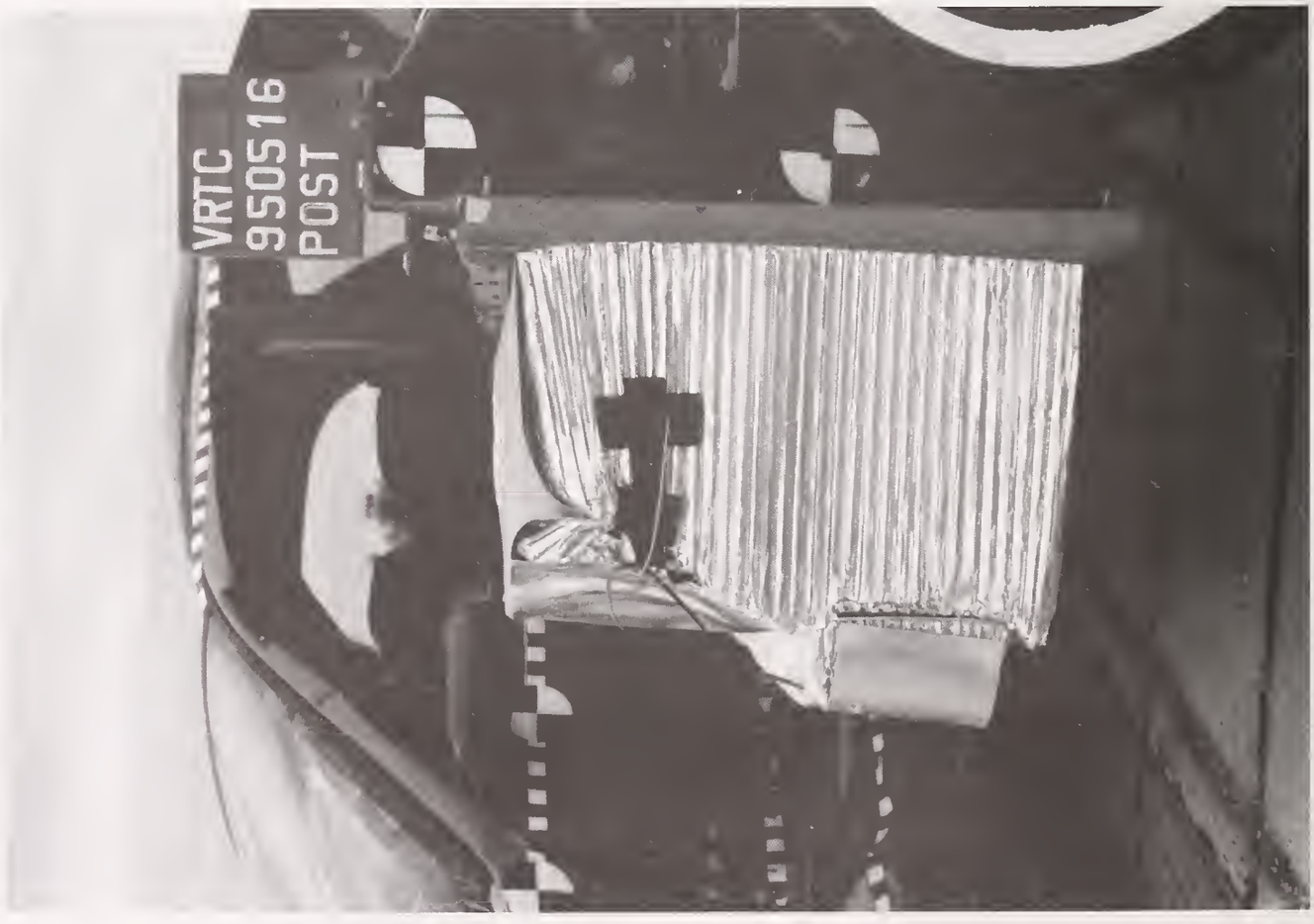

Figure A-28 Post-test Deformable Barrier Face Left Side View

Figure A-29 Pre-test Left Mid Underbody View

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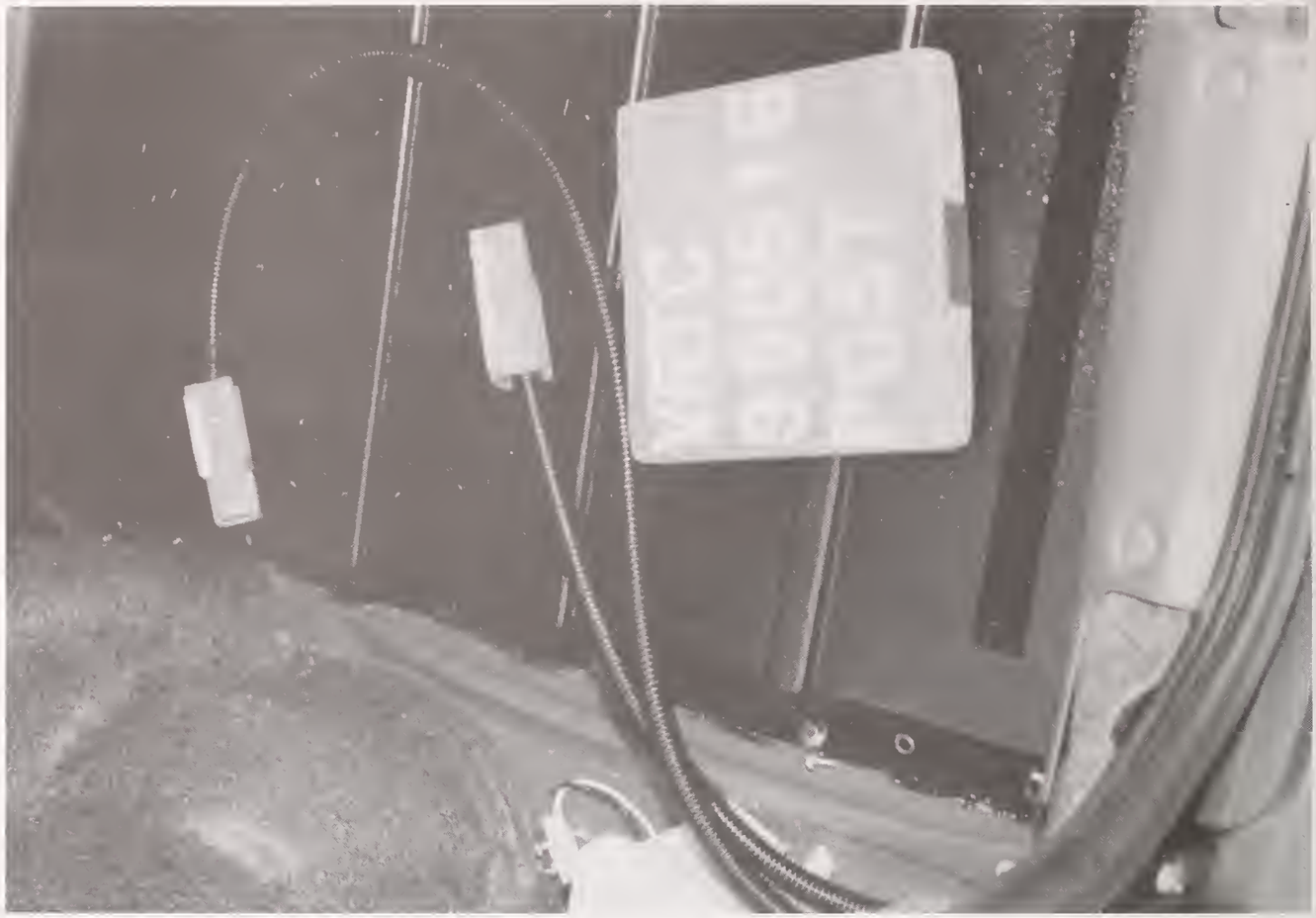


Figure A-30 Post-test Rear Battery Box Cover - View 1

Figure A-31 Post-test Rear Battery Box Cover - View 2

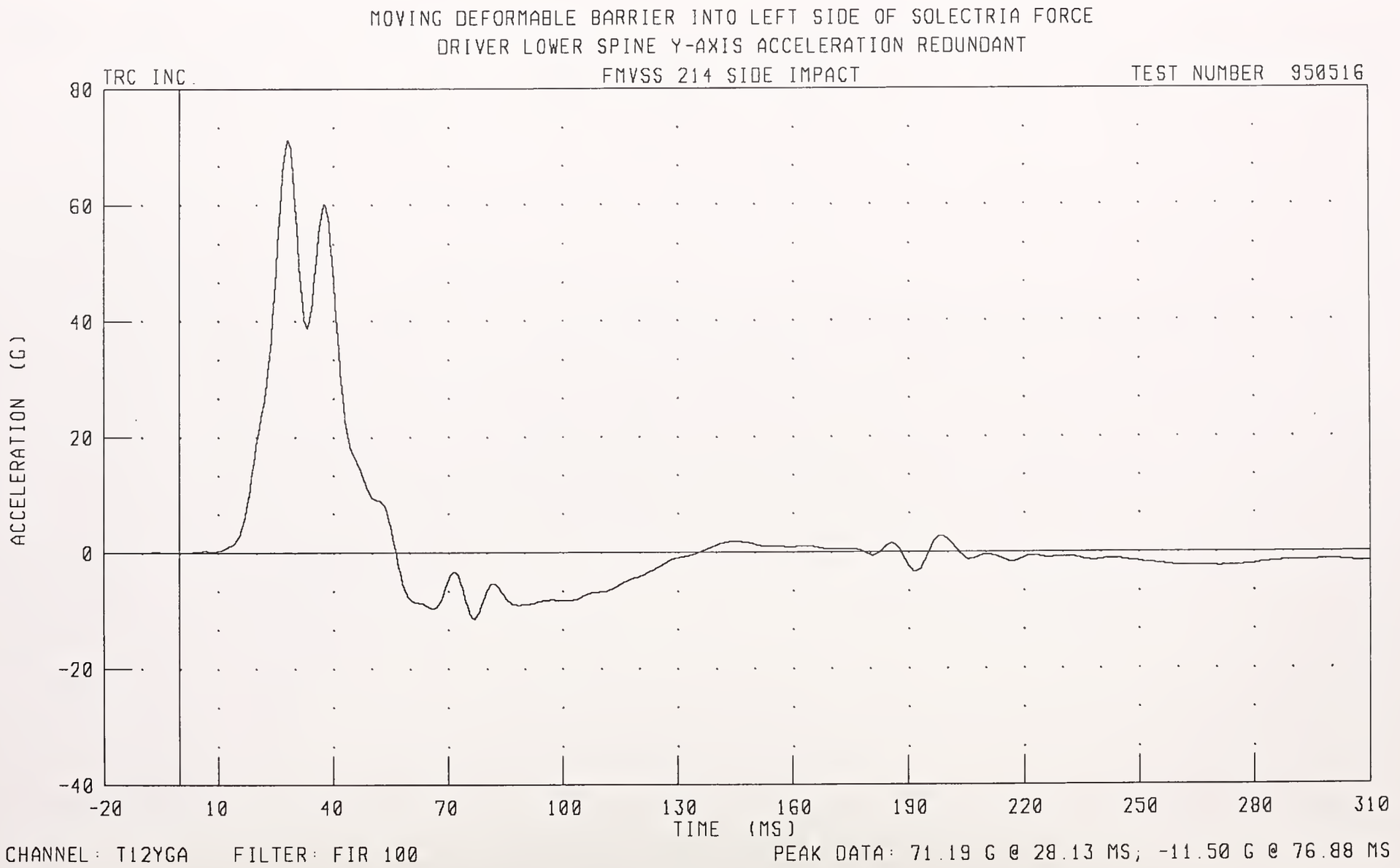
Figure A-32 Post-test Vehicle on Static Rollover View

Appendix B

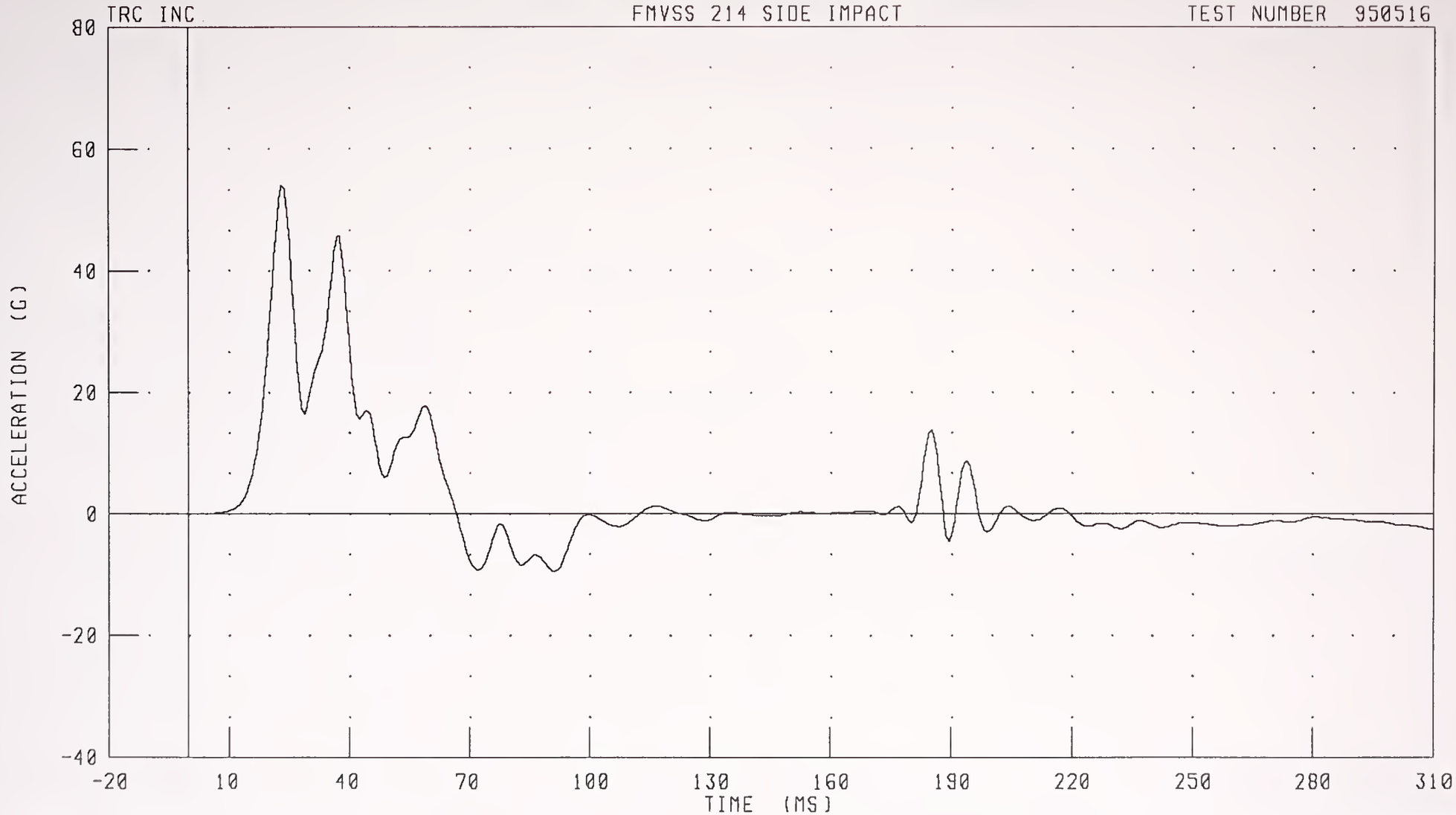
Data Plots

MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF SOLECTRIA FORCE
DRIVER LOWER SPINE Y-AXIS ACCELERATION

CHANNEL: T12YG1 FILTER: FIR 100 PEAK DATA: 70.06 G @ 28.13 MS; -11.80 G @ 76.88 MS

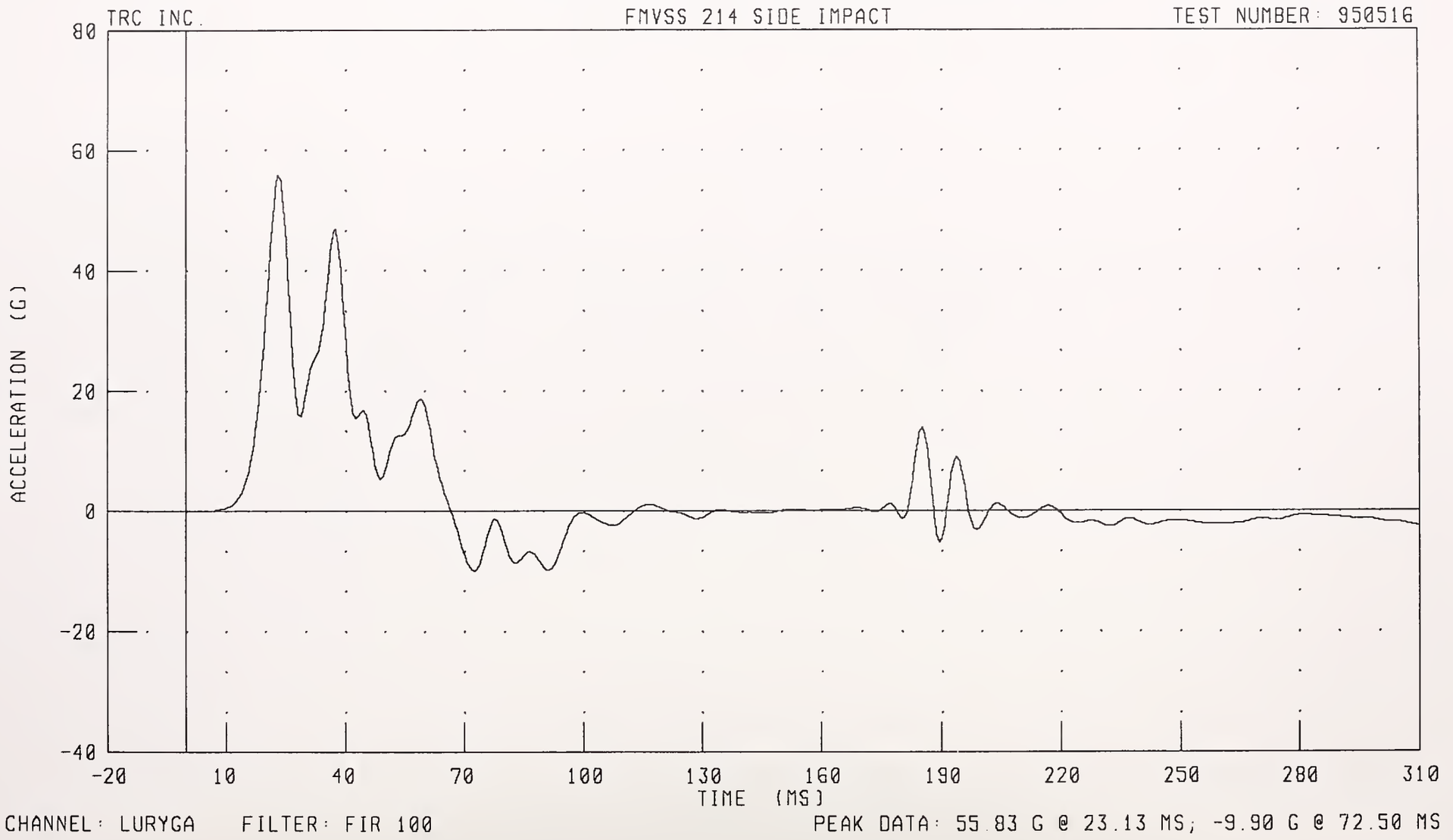

MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF SOLECTRIA FORCE
DRIVER LOWER SPINE Y-AXIS ACCELERATION REDUNDANT
TRC INC.
FMVSS 214 SIDE IMPACT
TEST NUMBER 950516
ACCELERATION (G)
80
60
40
20
0
-20
-40
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: T12YGA
FILTER: FIR 100
PEAK DATA: 71.19 G @ 28.13 MS; -11.50 G @ 76.88 MS

MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF SOLECTRIA FORCE
DRIVER LEFT UPPER RIB Y-AXIS ACCELERATION



CHANNEL: LURYG1 FILTER: FIR 100 PEAK DATA: 54.06 G @ 23.13 MS; -9.49 G @ 91.25 MS

MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF SOLECTRIA FORCE
DRIVER LEFT UPPER RIB Y-AXIS ACCELERATION REDUNDANT

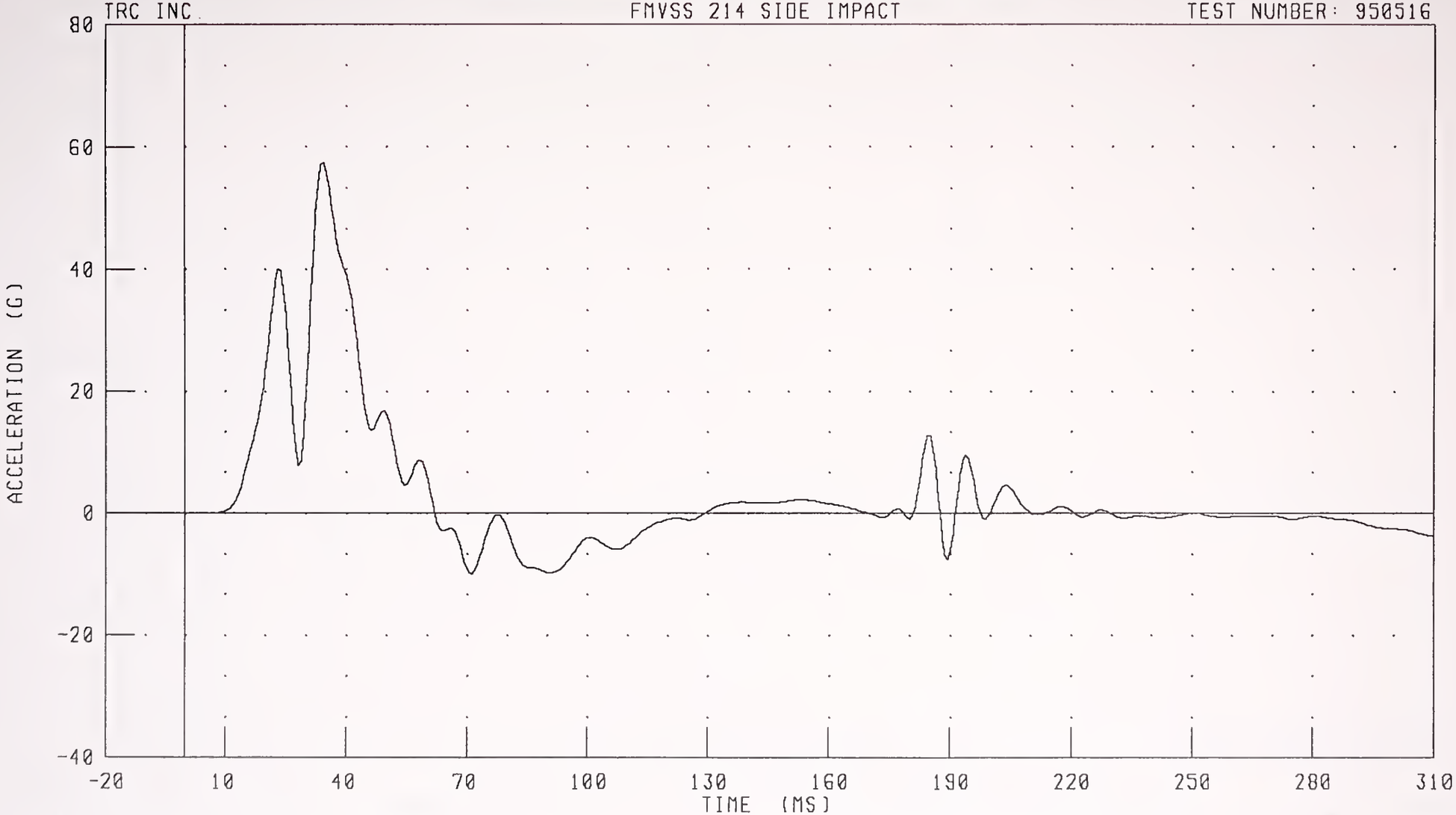


CHANNEL: LURYGA FILTER: FIR 100

PEAK DATA: 55.83 G @ 23.13 MS; -9.90 G @ 72.50 MS

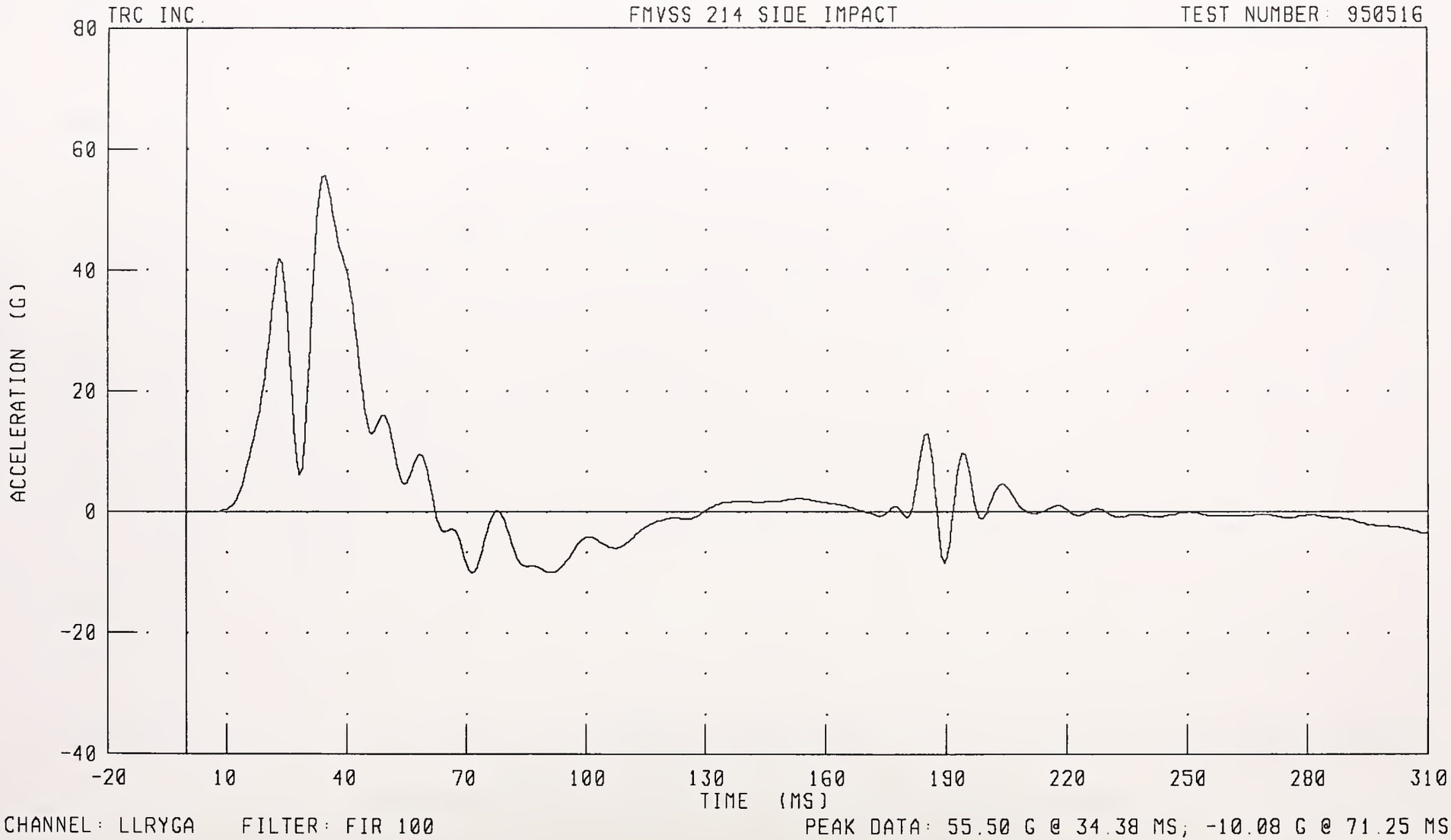
MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF SOLECTRIA FORCE
DRIVER LEFT LOWER RIB Y-AXIS ACCELERATION

TRC INC. FMVSS 214 SIDE IMPACT TEST NUMBER: 950516



CHANNEL: LLRYG1 FILTER: FIR 100 PEAK DATA: 57.46 G @ 34.38 MS; -9.91 G @ 71.25 MS

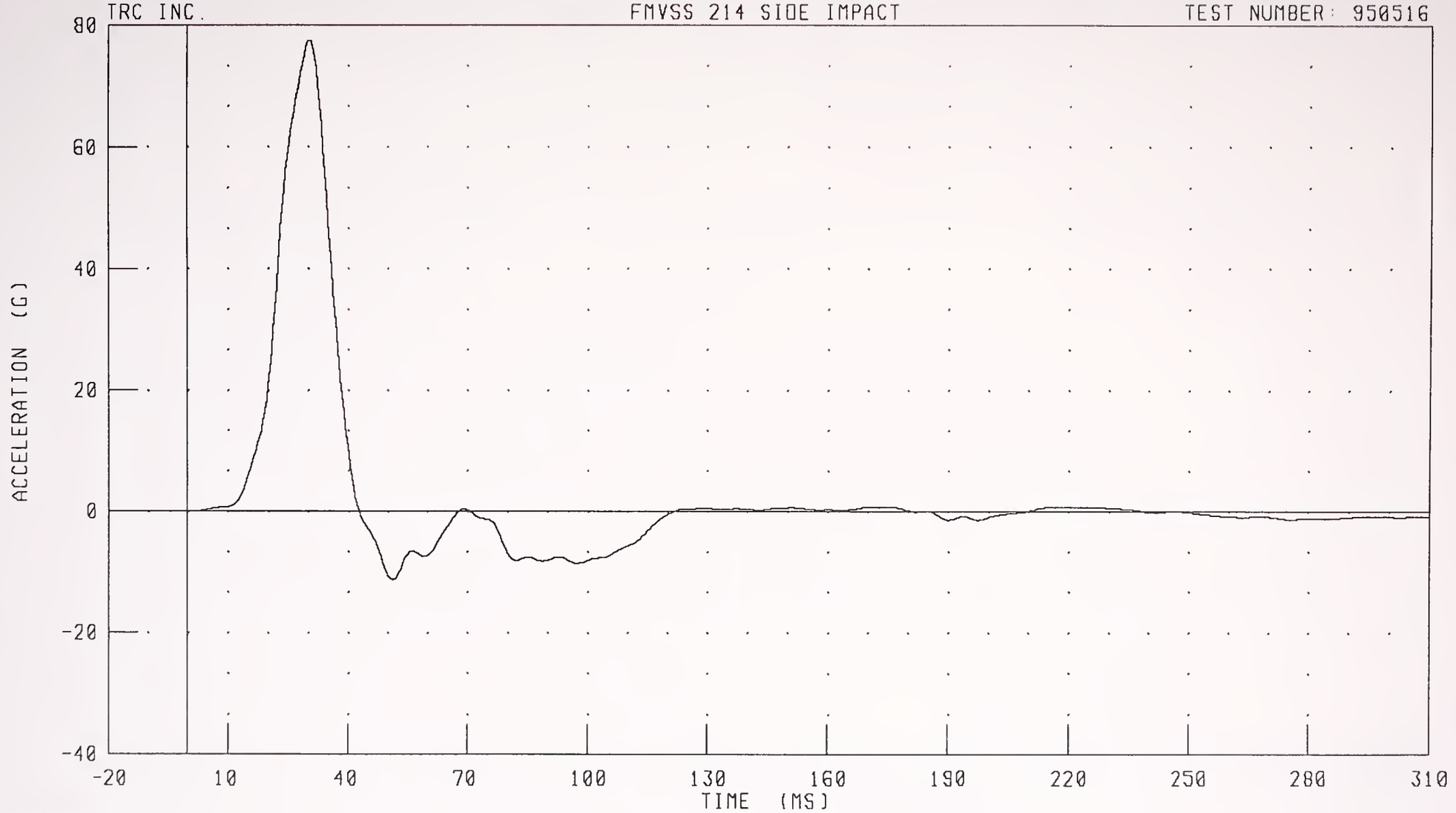
MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF SOLECTRIA FORCE
DRIVER LEFT LOWER RIB Y-AXIS ACCELERATION REDUNDANT



CHANNEL: LLRYGA FILTER: FIR 100

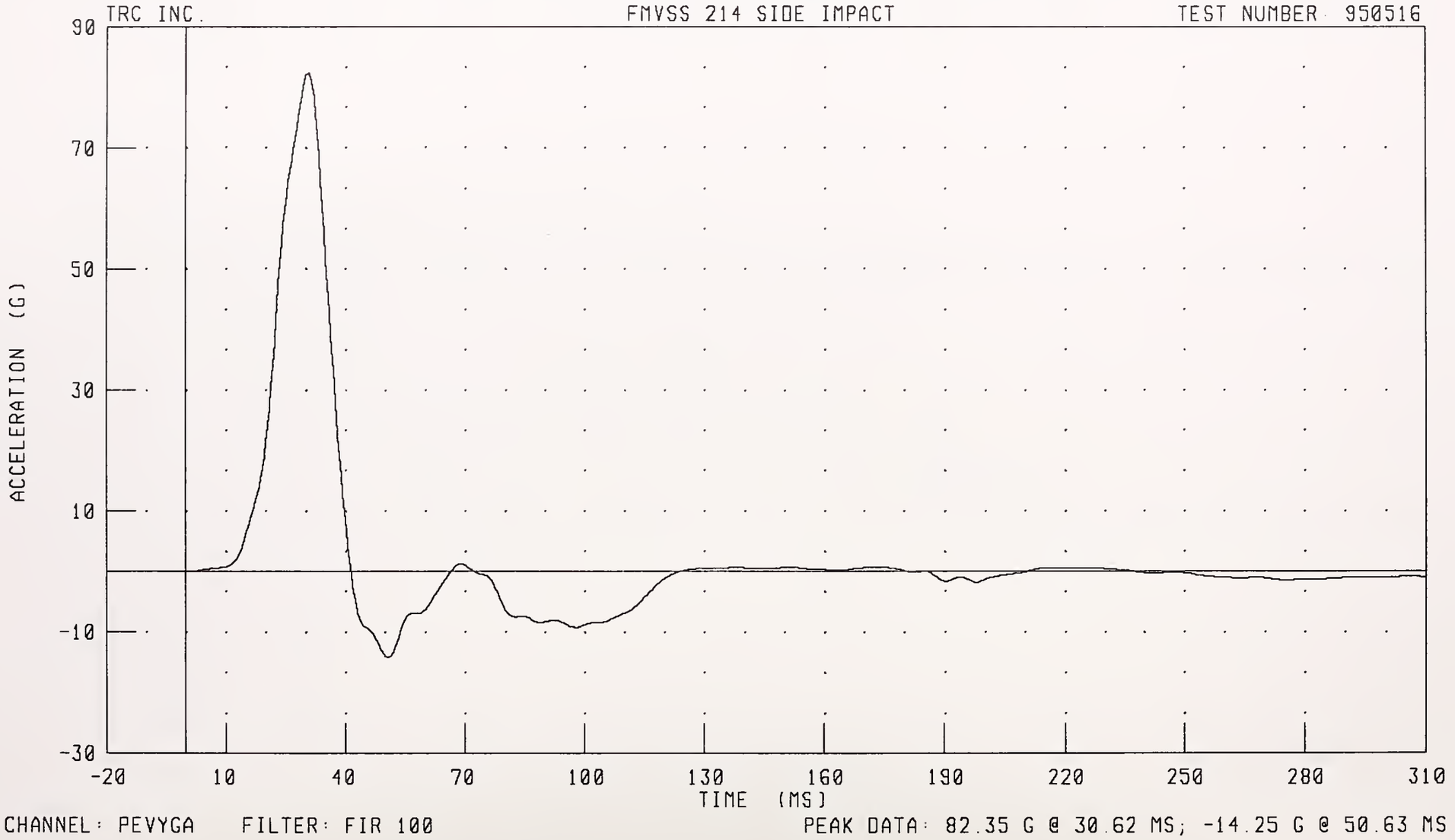
PEAK DATA: 55.50 G @ 34.38 MS; -10.08 G @ 71.25 MS

MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF SOLECTRIA FORCE
DRIVER PELVIS Y-AXIS ACCELERATION



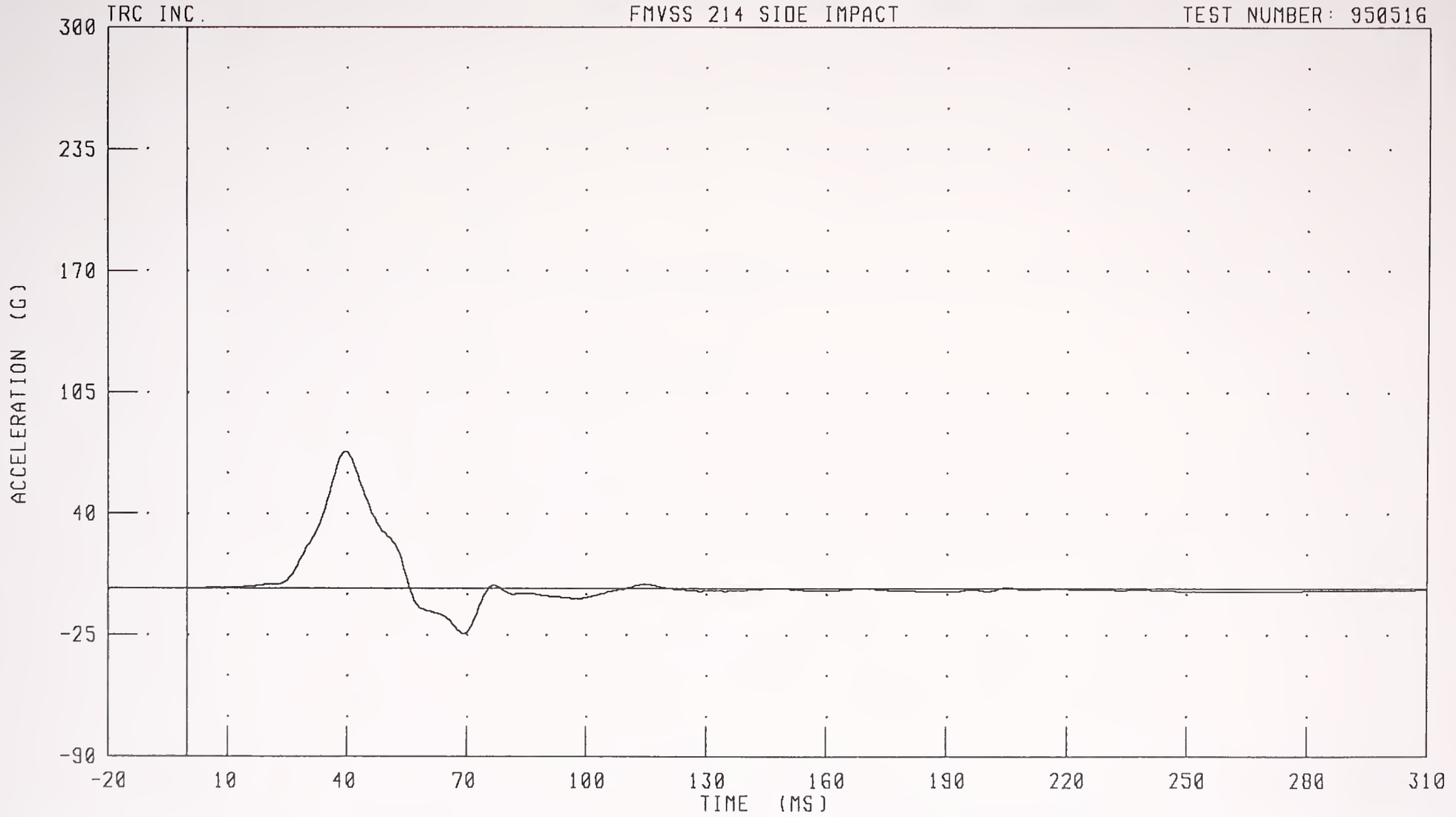
CHANNEL: PEVYG1 FILTER: FIR 100 PEAK DATA: 77.48 G @ 30.00 MS, -11.31 G @ 51.25 MS

MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF SOLECTRIA FORCE
DRIVER PELVIS Y-AXIS ACCELERATION REDUNDANT



CHANNEL: PEVYGA FILTER: FIR 100 PEAK DATA: 82.35 G @ 30.62 MS; -14.25 G @ 50.63 MS

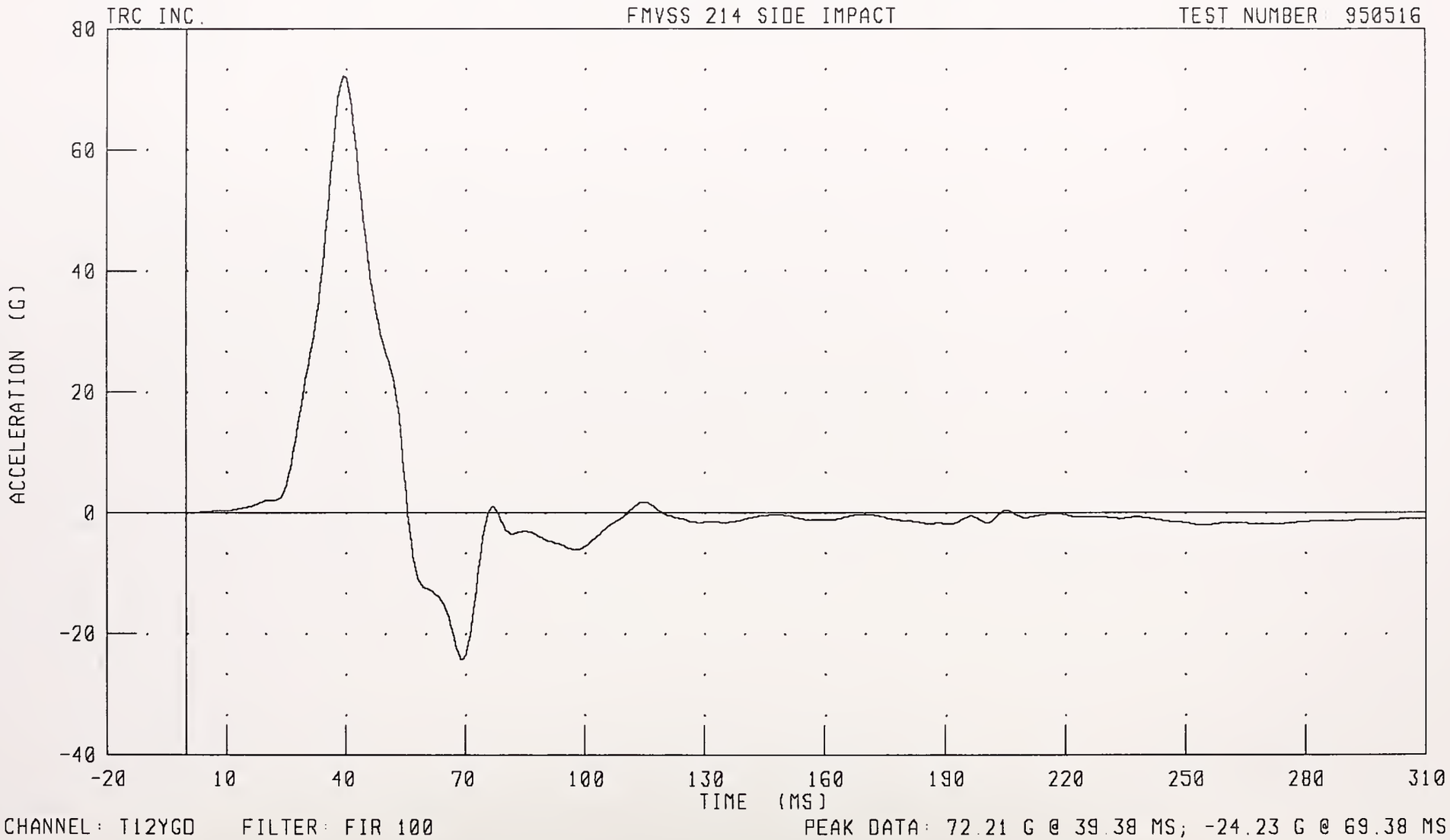
MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF SOLECTRIA FORCE
LEFT REAR PASSENEGER LOWER SPINE Y-AXIS ACCELERATION



CHANNEL: T12YG4 FILTER: FIR 100

PEAK DATA: 73.12 G @ 39.38 MS; -24.23 G @ 69.38 MS

MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF SOLECTRIA FORCE
LEFT REAR PASSENEGER LOWER SPINE Y-AXIS ACCELERATION REDUNDANT

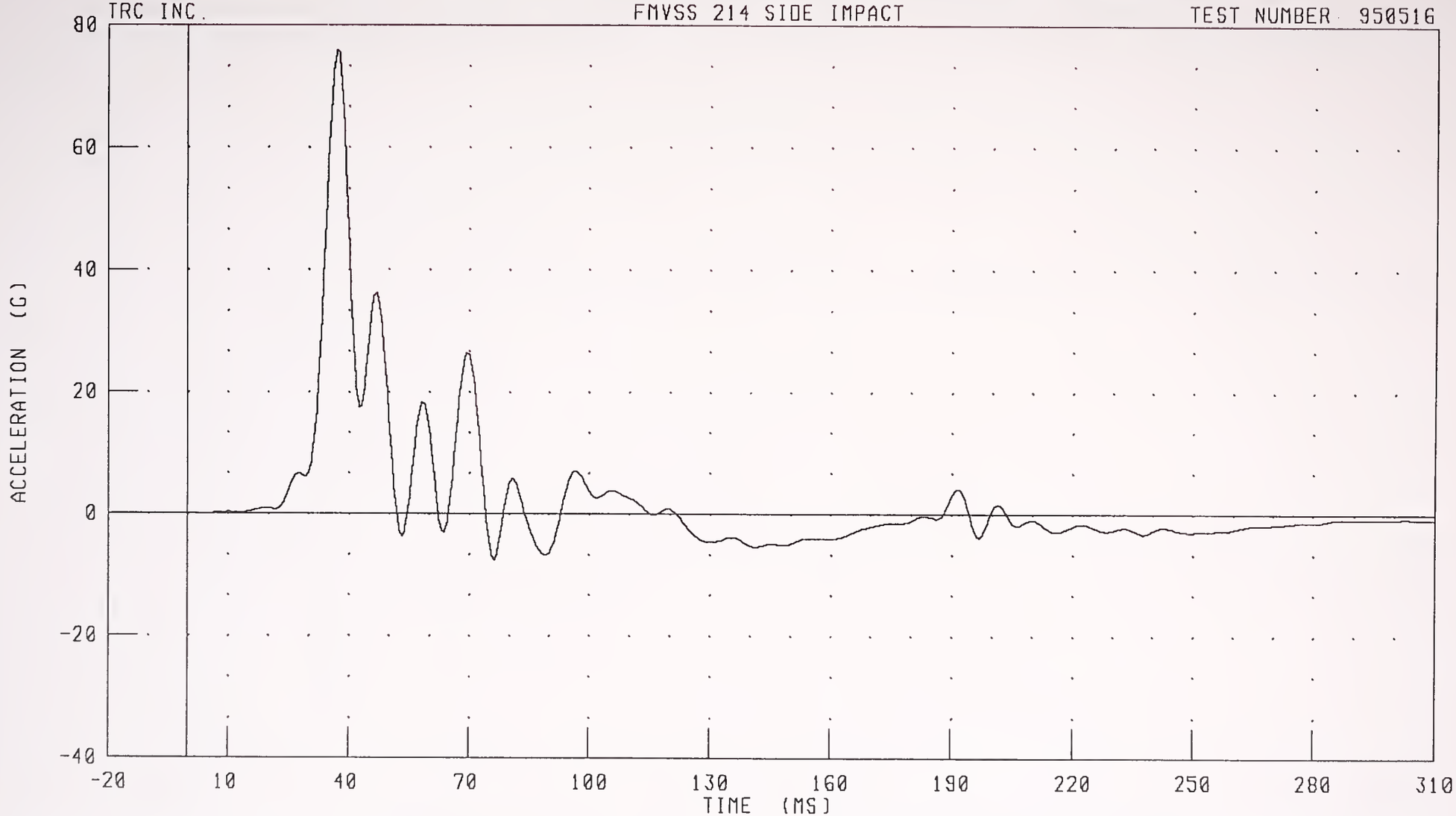


CHANNEL: T12YGD FILTER: FIR 100 PEAK DATA: 72.21 G @ 39.38 MS; -24.23 G @ 69.38 MS

MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF SOLECTRIA FORCE

LEFT REAR PASSENEGER LEFT UPPER RIB Y-AXIS ACCELERATION REDUNDANT

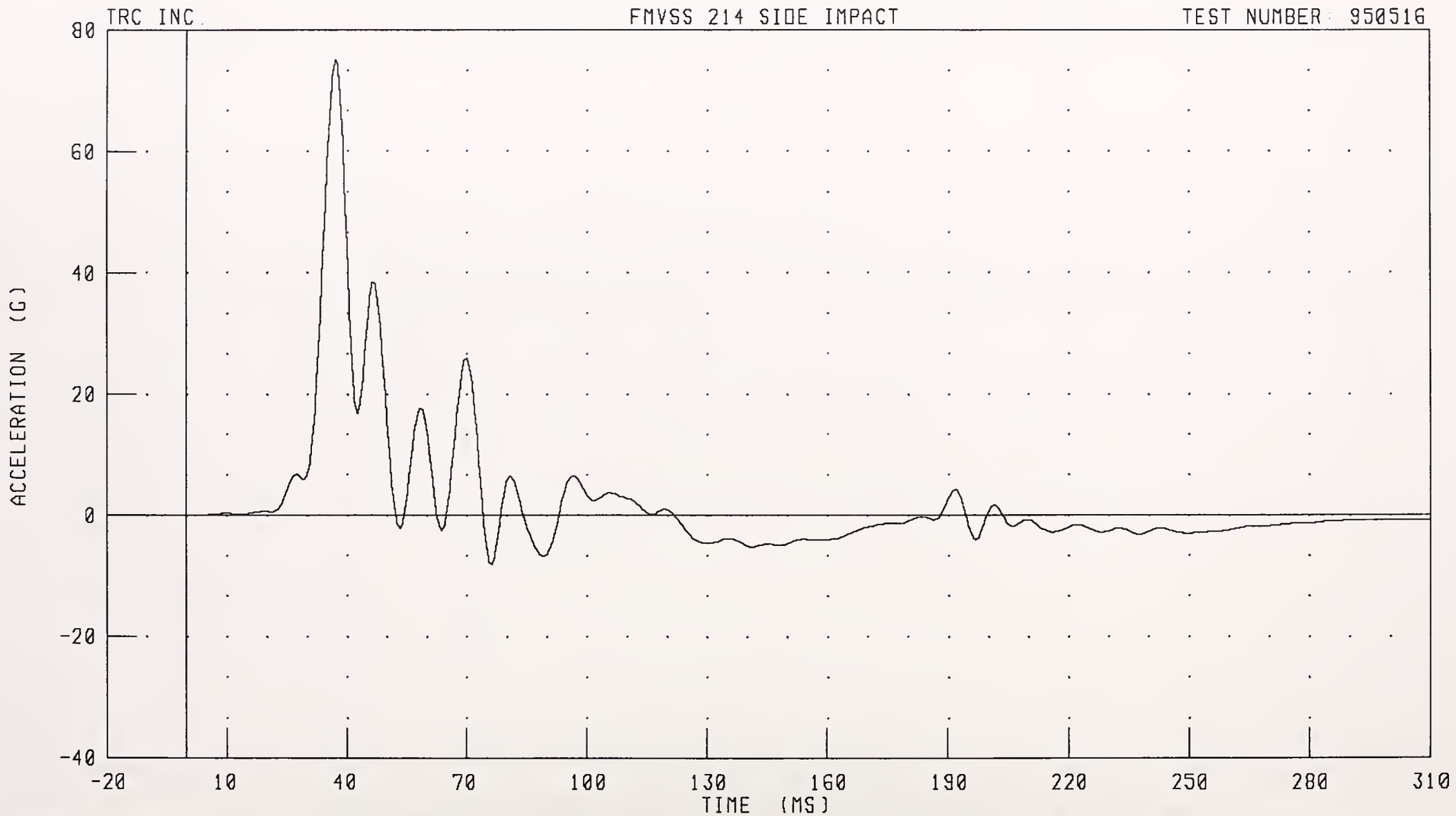
TRC INC. FMVSS 214 SIDE IMPACT TEST NUMBER 950516



CHANNEL: LURYG4 FILTER: FIR 100

PEAK DATA: 75.84 G @ 36.88 MS; -7.55 G @ 76.25 MS

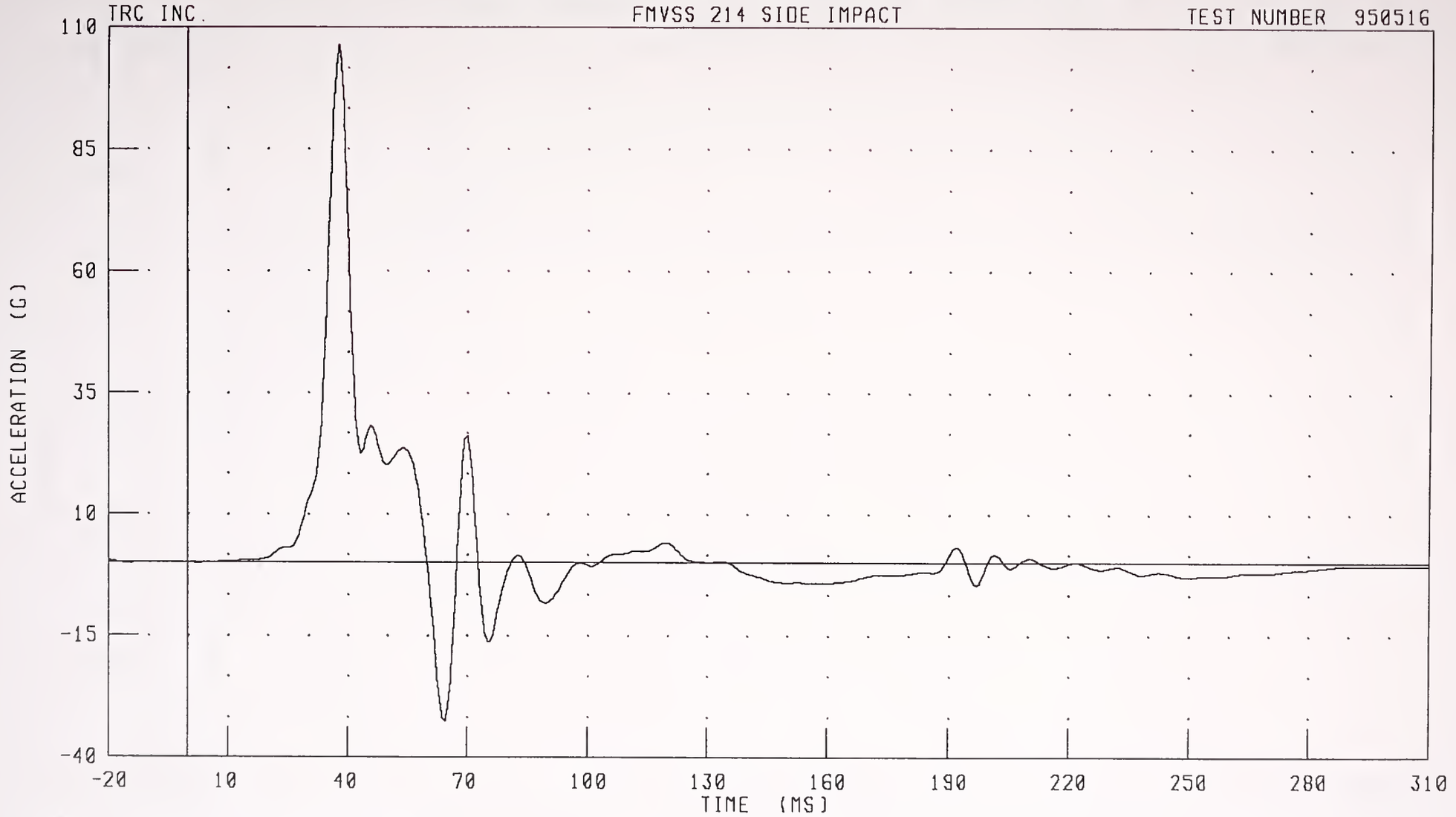
MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF SOLECTRIA FORCE
LEFT REAR PASSENEGER LEFT UPPER RIB Y-AXIS ACCELERATION REDUNDANT



CHANNEL: LURYGD FILTER: FIR 100

PEAK DATA: 75.12 G @ 36.88 MS; -8.14 G @ 76.25 MS

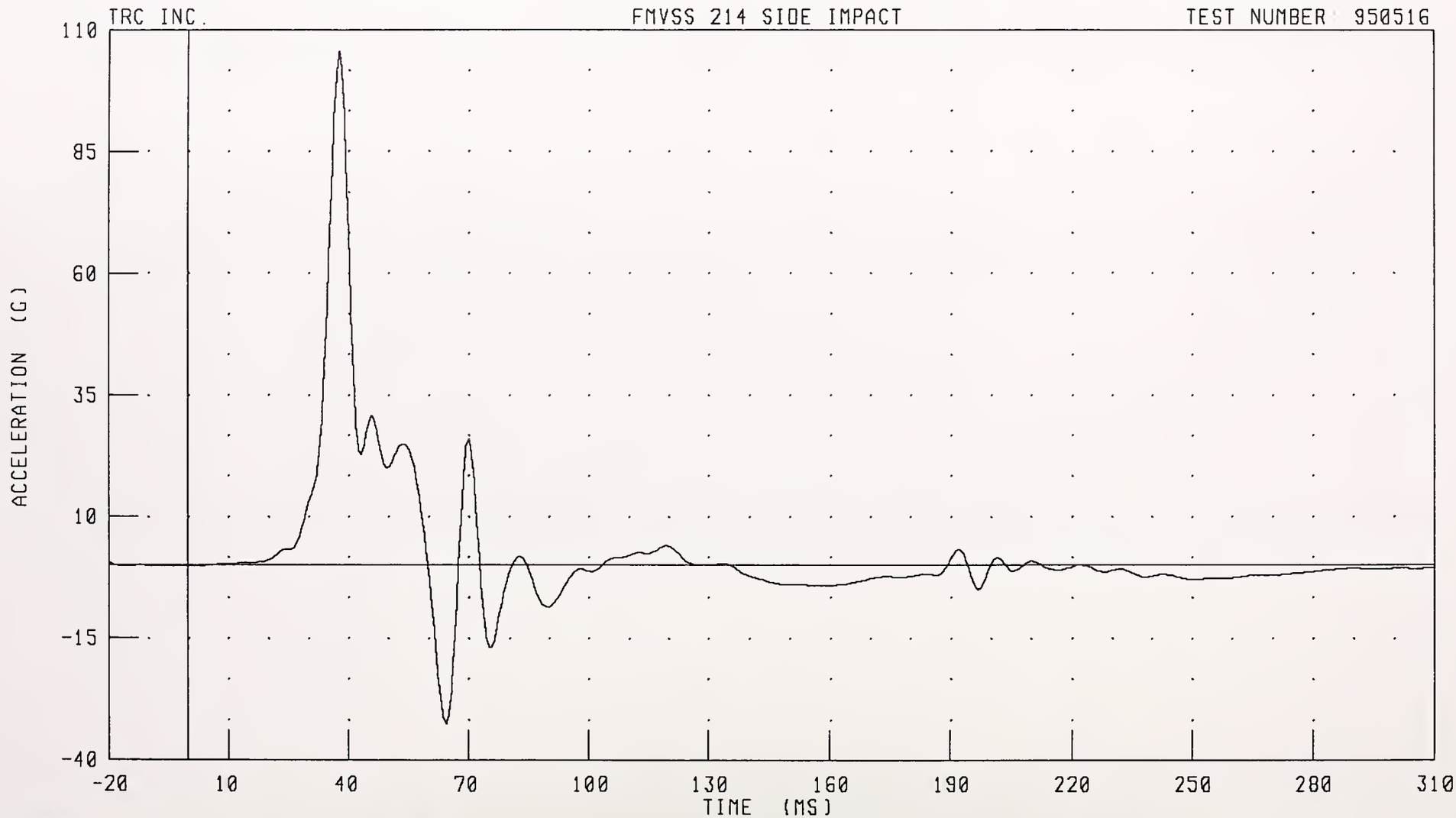
MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF SOLECTRIA FORCE
LEFT REAR PASSENEGER LEFT LOWER RIB Y-AXIS ACCELERATION



CHANNEL: LLRYG4 FILTER: FIR 100

PEAK DATA: 106.25 G @ 37.50 MS; -32.50 G @ 64.38 MS

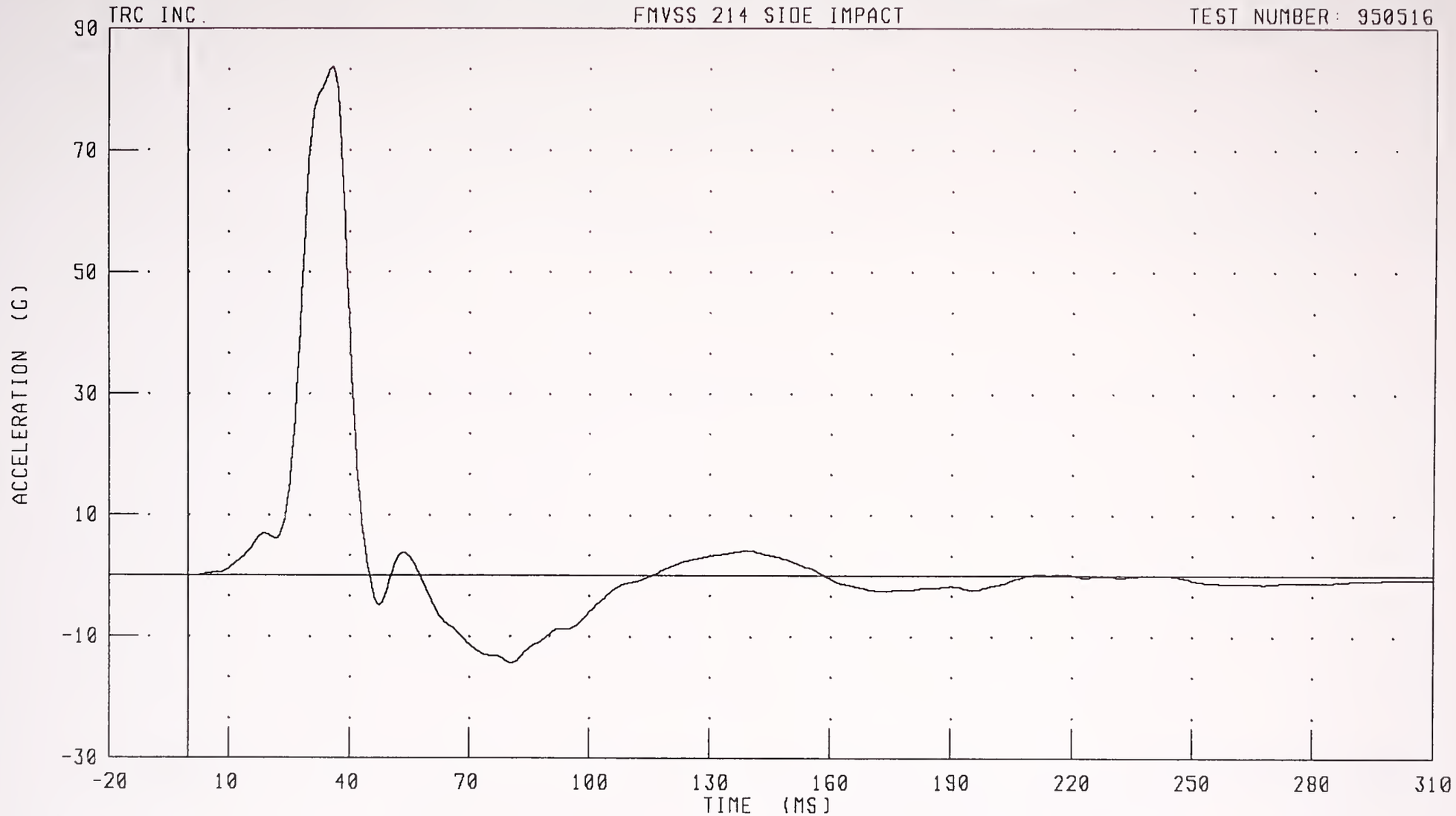
MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF SOLECTRIA FORCE
LEFT REAR PASSENEGER LEFT LOWER RIB Y-AXIS ACCELERATION REDUNDANT



CHANNEL: LLRYGD FILTER: FIR 100

PEAK DATA: 105.60 G @ 37.50 MS; -32.52 G @ 64.38 MS

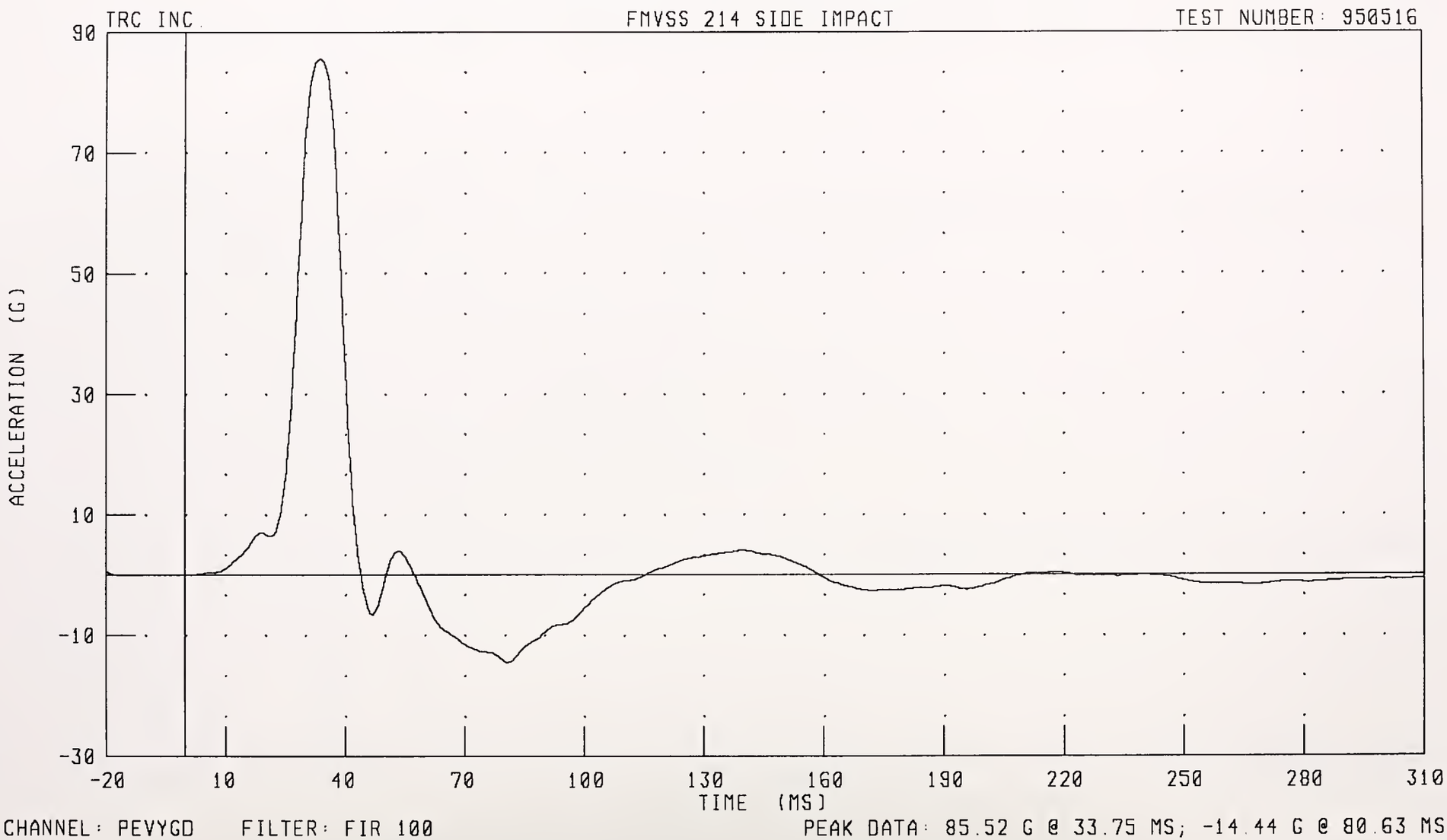
MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF SOLECTRIA FORCE
LEFT REAR PASSENEGER PELVIS Y-AXIS ACCELERATION



CHANNEL: PEVYG4 FILTER: FIR 100

PEAK DATA: 83.60 G @ 35.63 MS; -14.37 G @ 80.63 MS

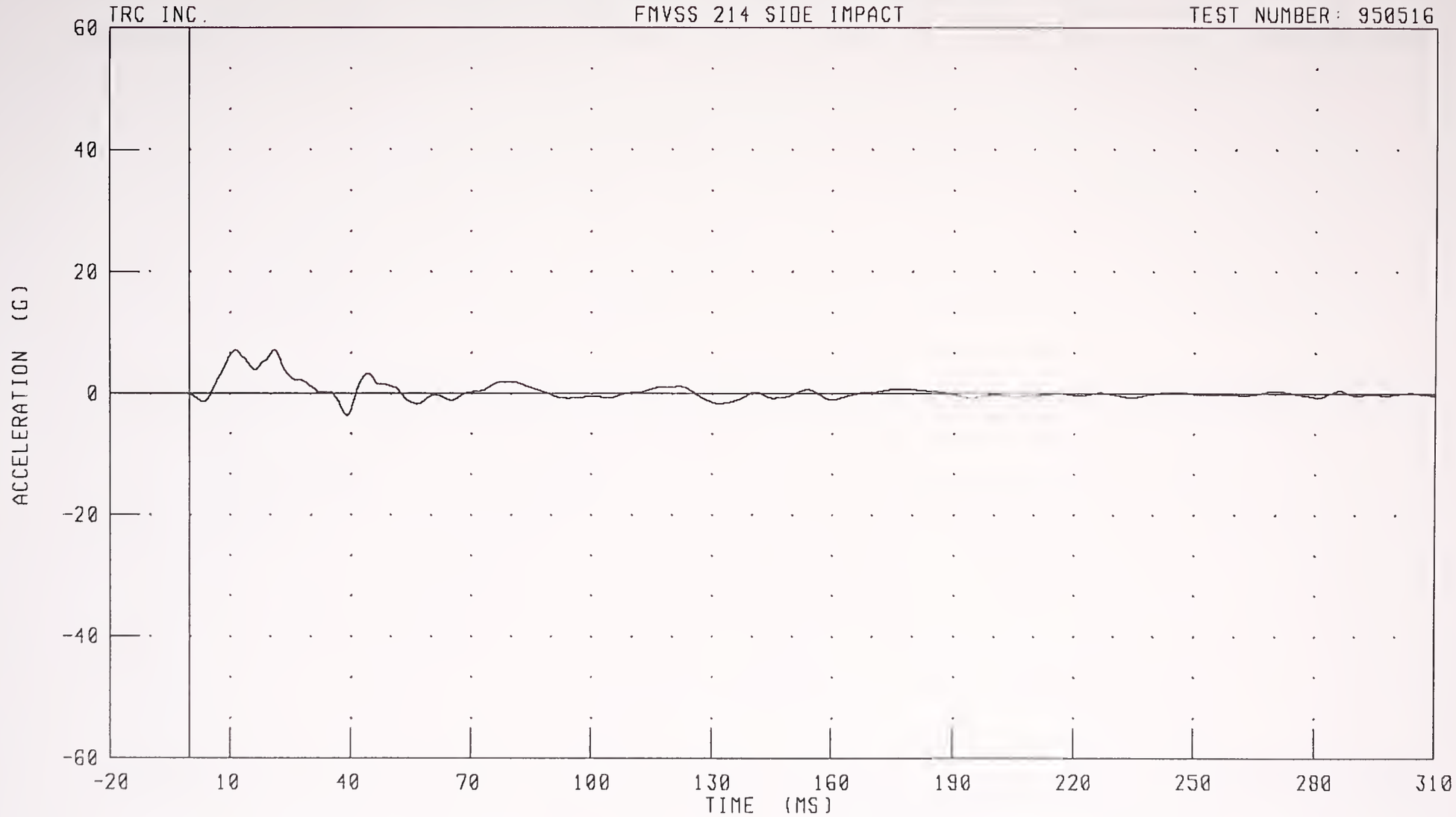
MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF SOLECTRIA FORCE
LEFT REAR PASSENEGER PELVIS Y-AXIS ACCELERATION REDUNDANT



CHANNEL: PEVYGD FILTER: FIR 100

PEAK DATA: 85.52 G @ 33.75 MS; -14.44 G @ 80.63 MS

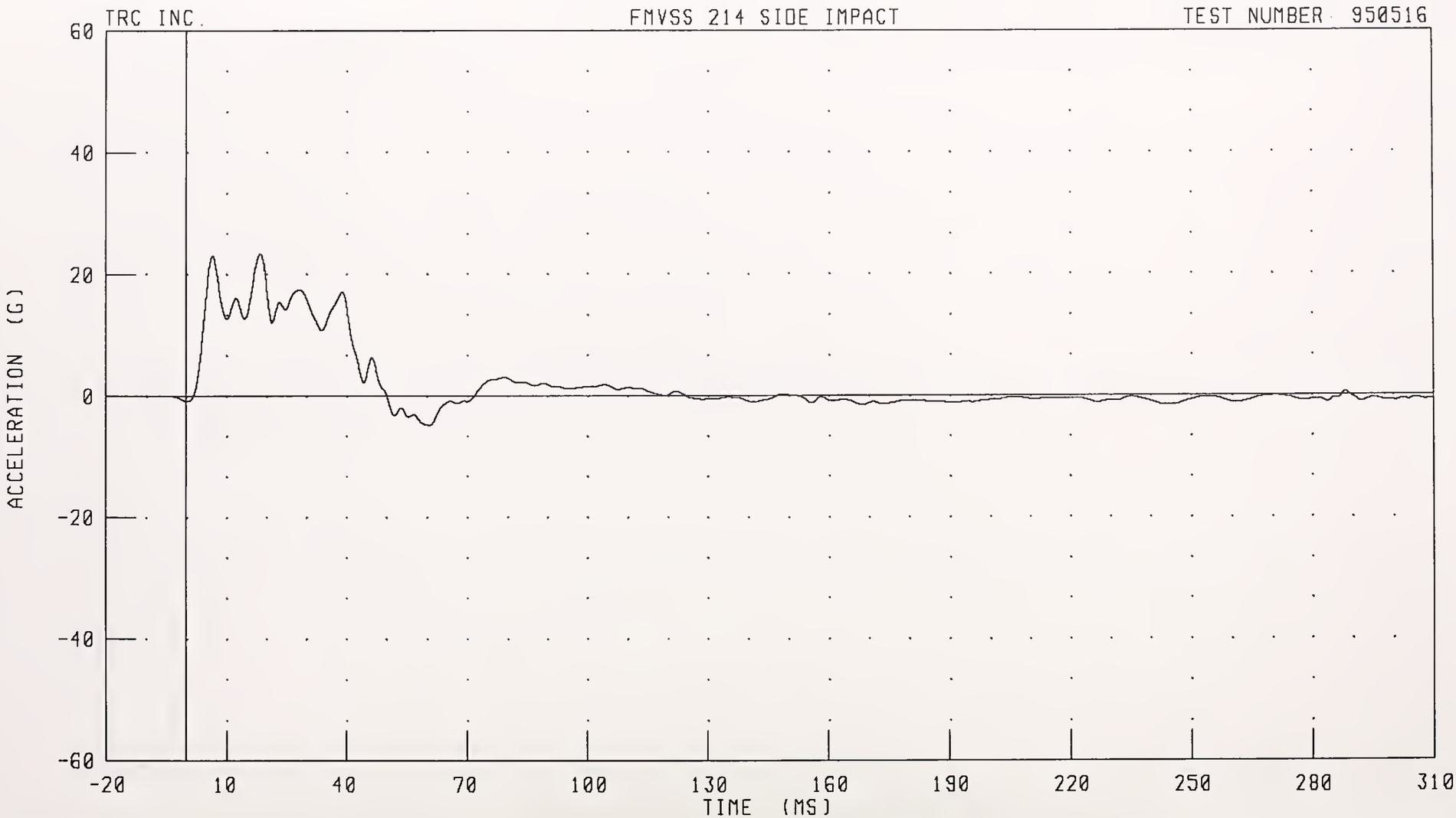
MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF SOLECTRIA FORCE
RIGHT FRONT SILL X-AXIS ACCELERATION



CHANNEL RFSXG FILTER CH. CLASS 60

PEAK DATA: 7.16 G @ 21.12 MS; -3.65 G @ 39.04 MS

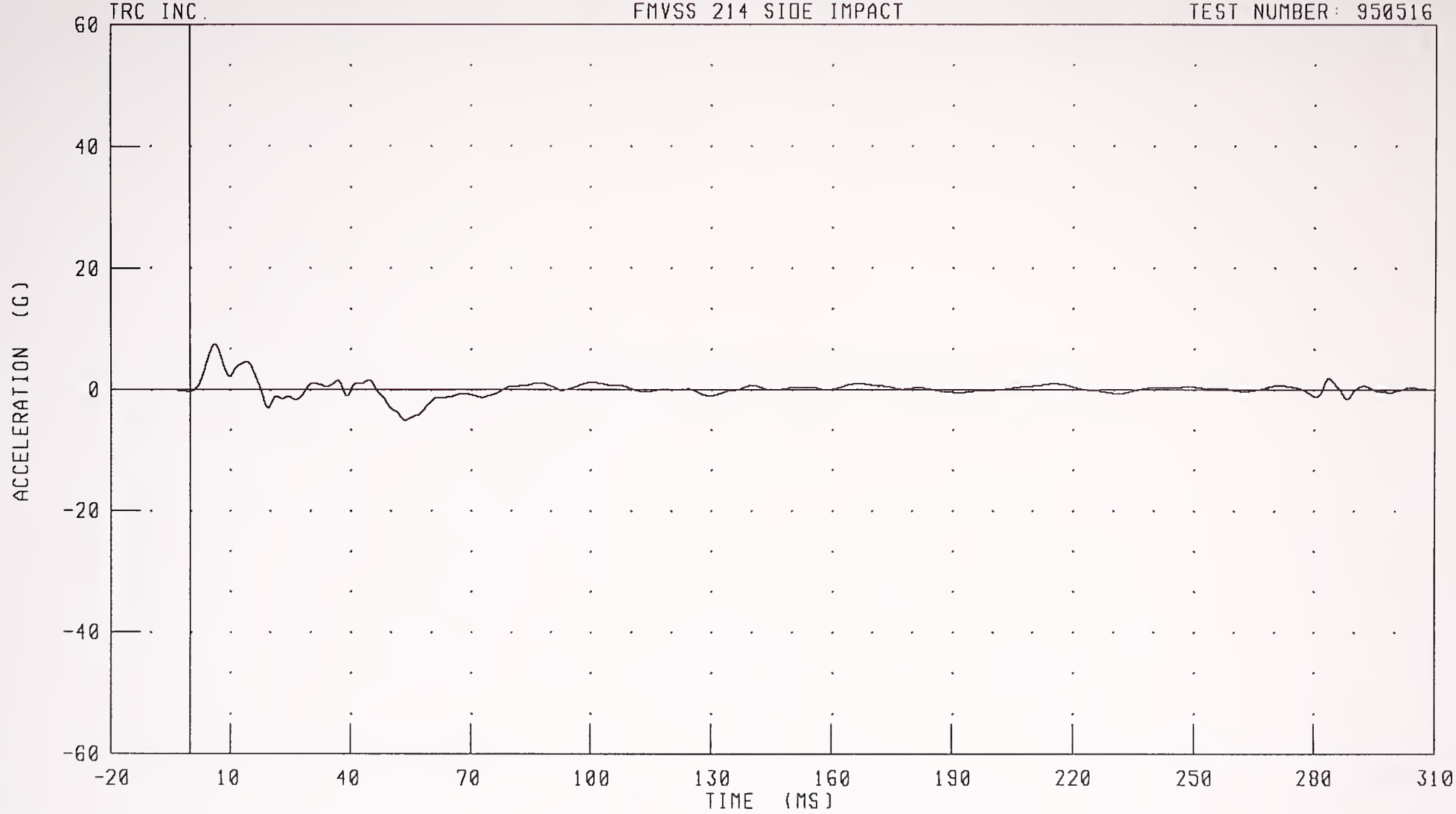
MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF SOLECTRIA FORCE
RIGHT FRONT SILL Y-AXIS ACCELERATION



CHANNEL: RFSYG FILTER: CH. CLASS 60 PEAK DATA: 23.46 G @ 18.40 MS; -4.82 G @ 60.56 MS

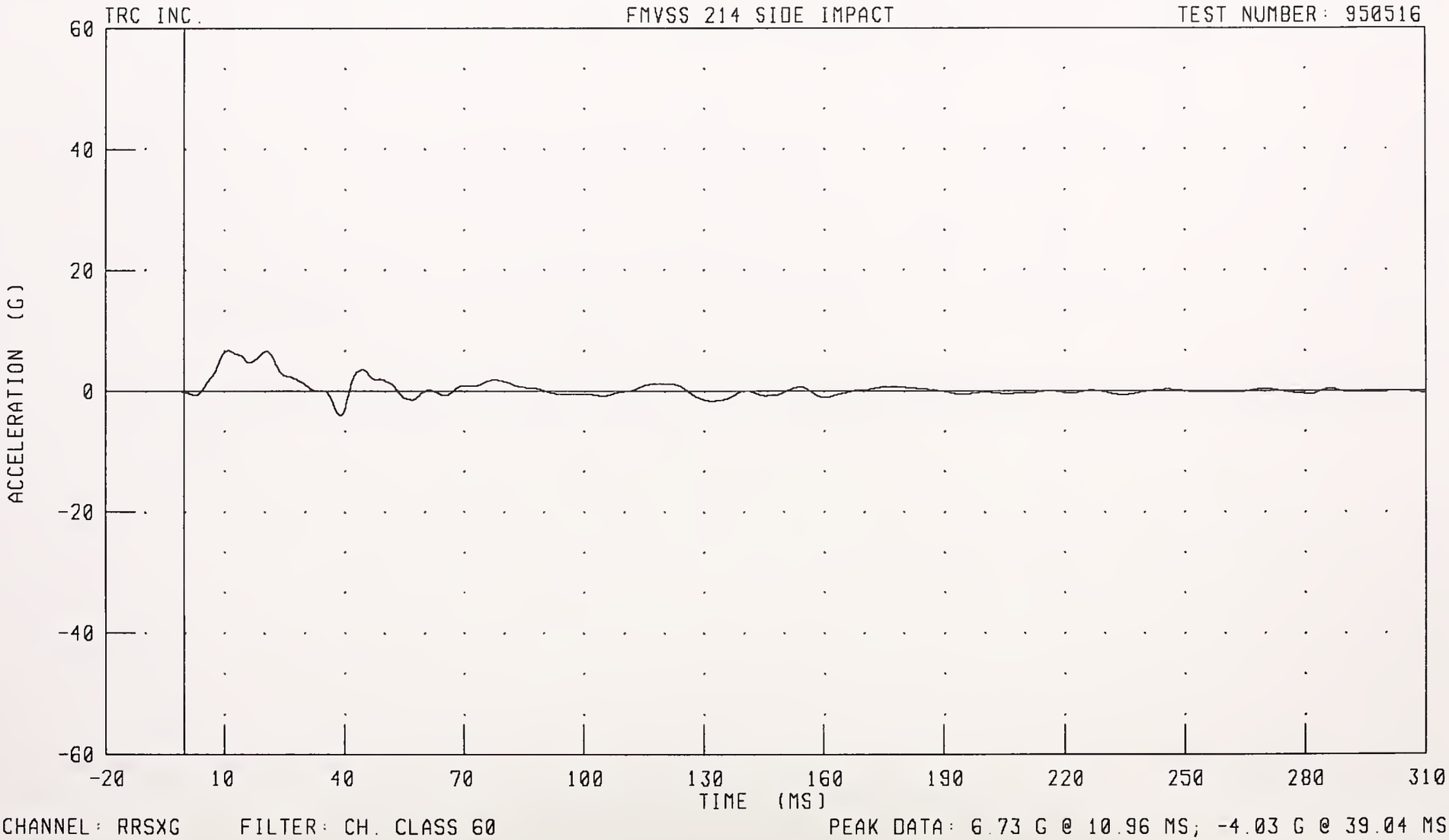
MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF SOLECTRIA FORCE
RIGHT FRONT SILL Z-AXIS ACCELERATION

TRC INC. FMVSS 214 SIDE IMPACT TEST NUMBER: 950516



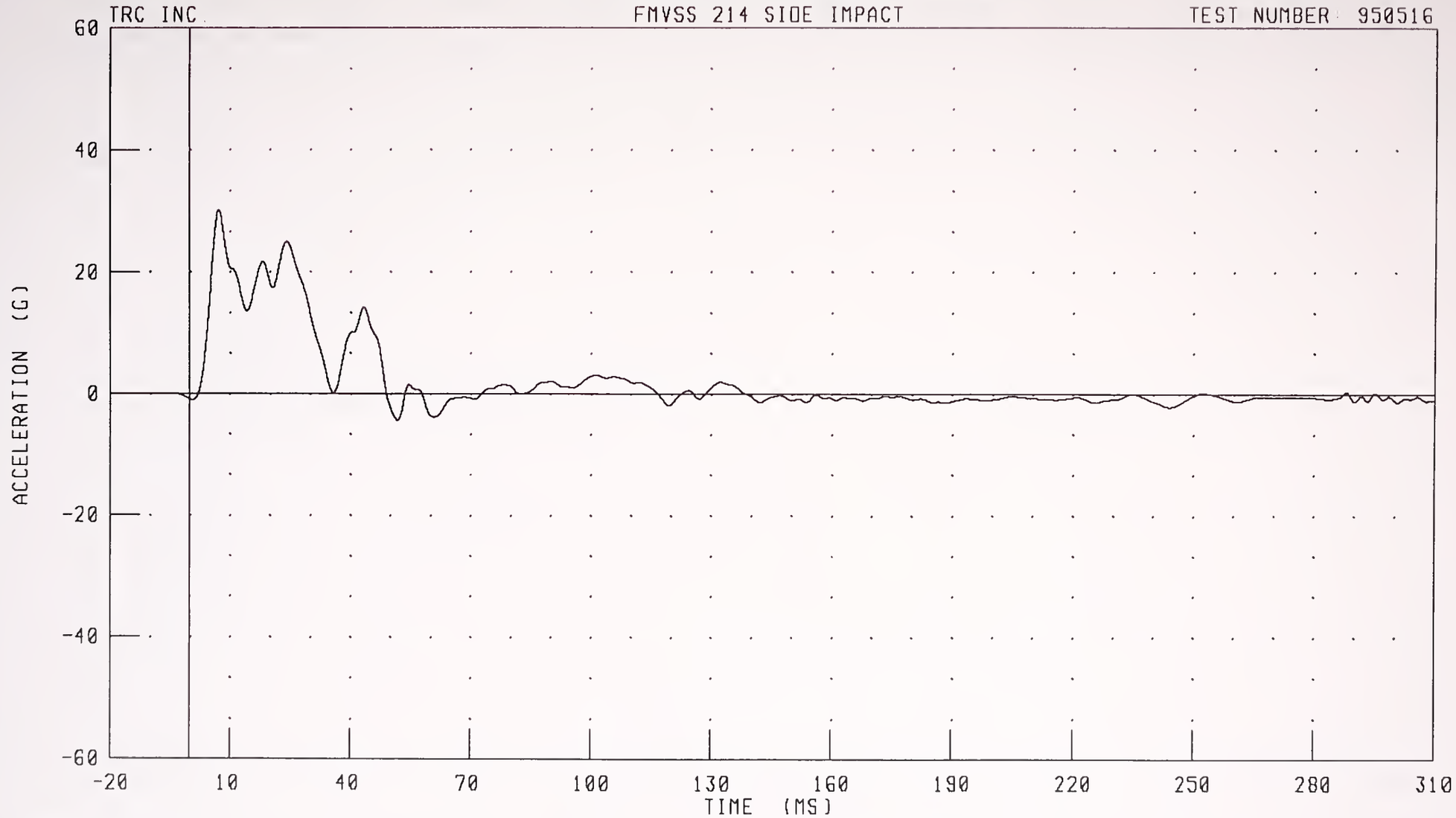
CHANNEL: RFSZG FILTER: CH. CLASS 60 PEAK DATA: 7.49 G @ 6.16 MS; -5.05 G @ 53.60 MS

MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF SOLECTRIA FORCE
RIGHT REAR SILL X-AXIS ACCELERATION



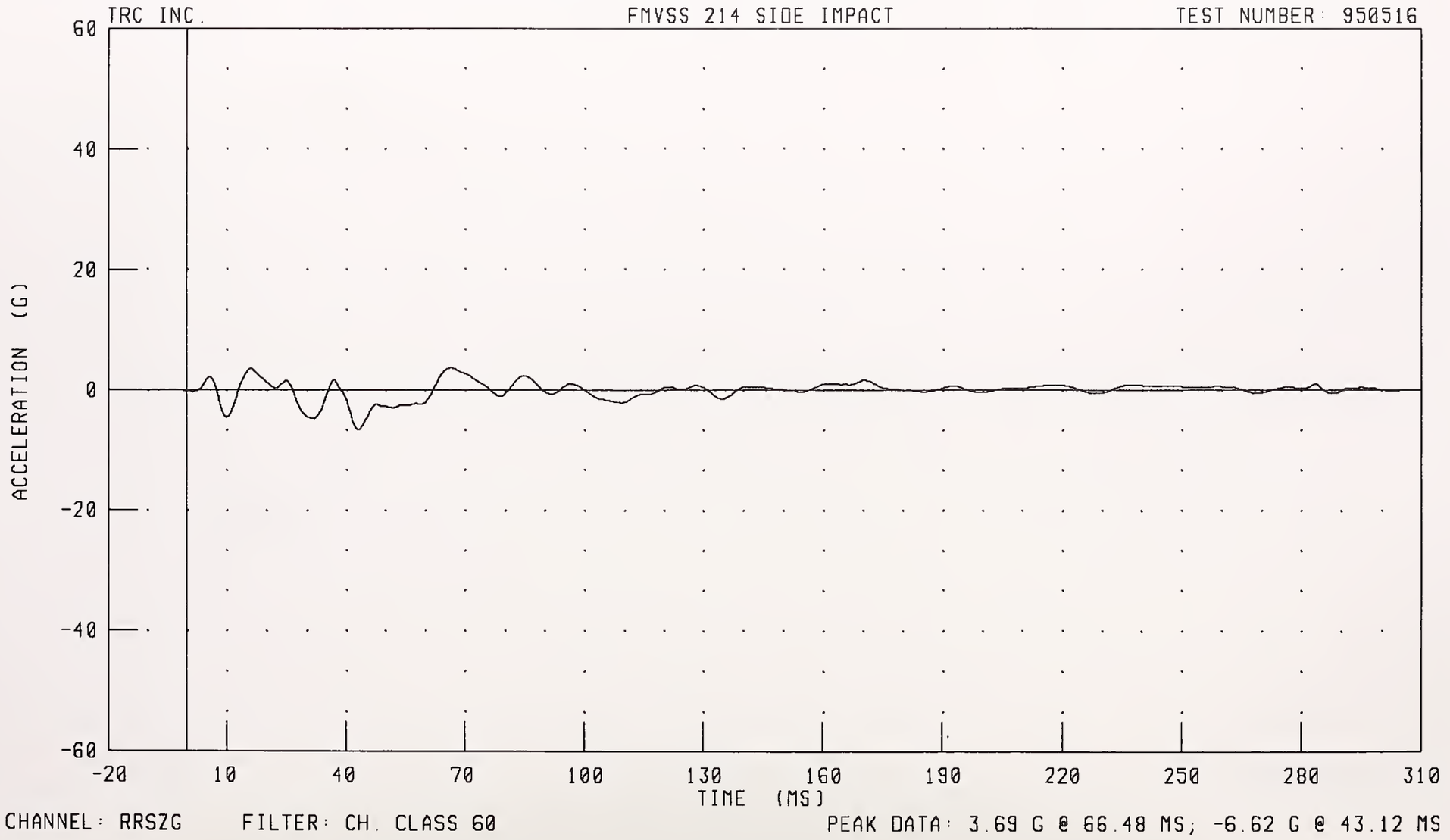
CHANNEL: RRSXG FILTER: CH. CLASS 60 PEAK DATA: 6.73 G @ 10.96 MS; -4.03 G @ 39.04 MS

MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF SOLECTRIA FORCE
RIGHT REAR SILL Y-AXIS ACCELERATION



CHANNEL: RRSYG FILTER: CH. CLASS 60 PEAK DATA: 30.21 G @ 7.28 MS; -4.38 G @ 51.76 MS

MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF SOLECTRIA FORCE
RIGHT REAR SILL Z-AXIS ACCELERATION

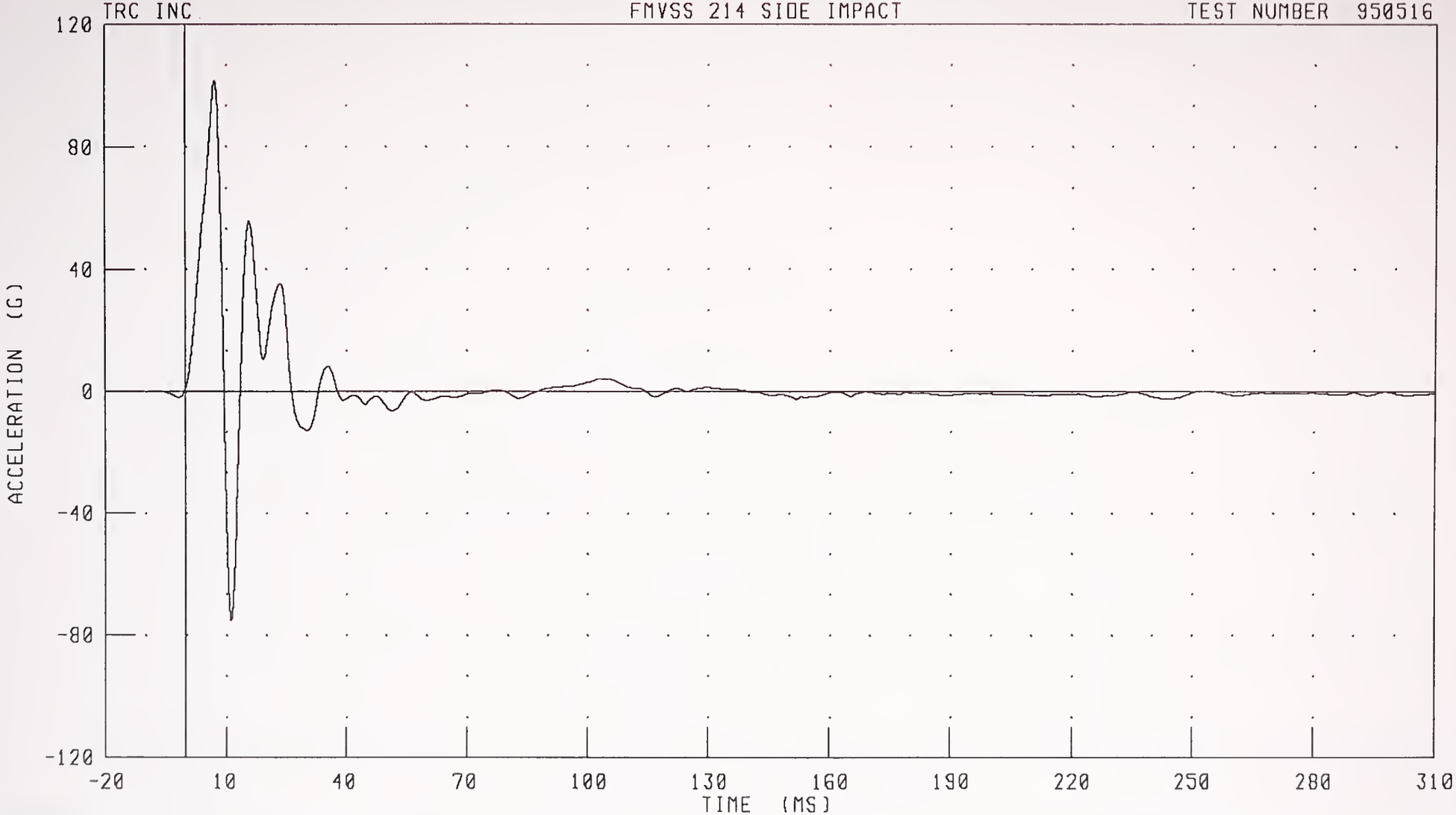


CHANNEL: RRSZG FILTER: CH. CLASS 60 PEAK DATA: 3.69 G @ 66.48 MS; -6.62 G @ 43.12 MS

MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF SOLECTRIA FORCE

LEFT REAR SILL Y-AXIS ACCELERATION

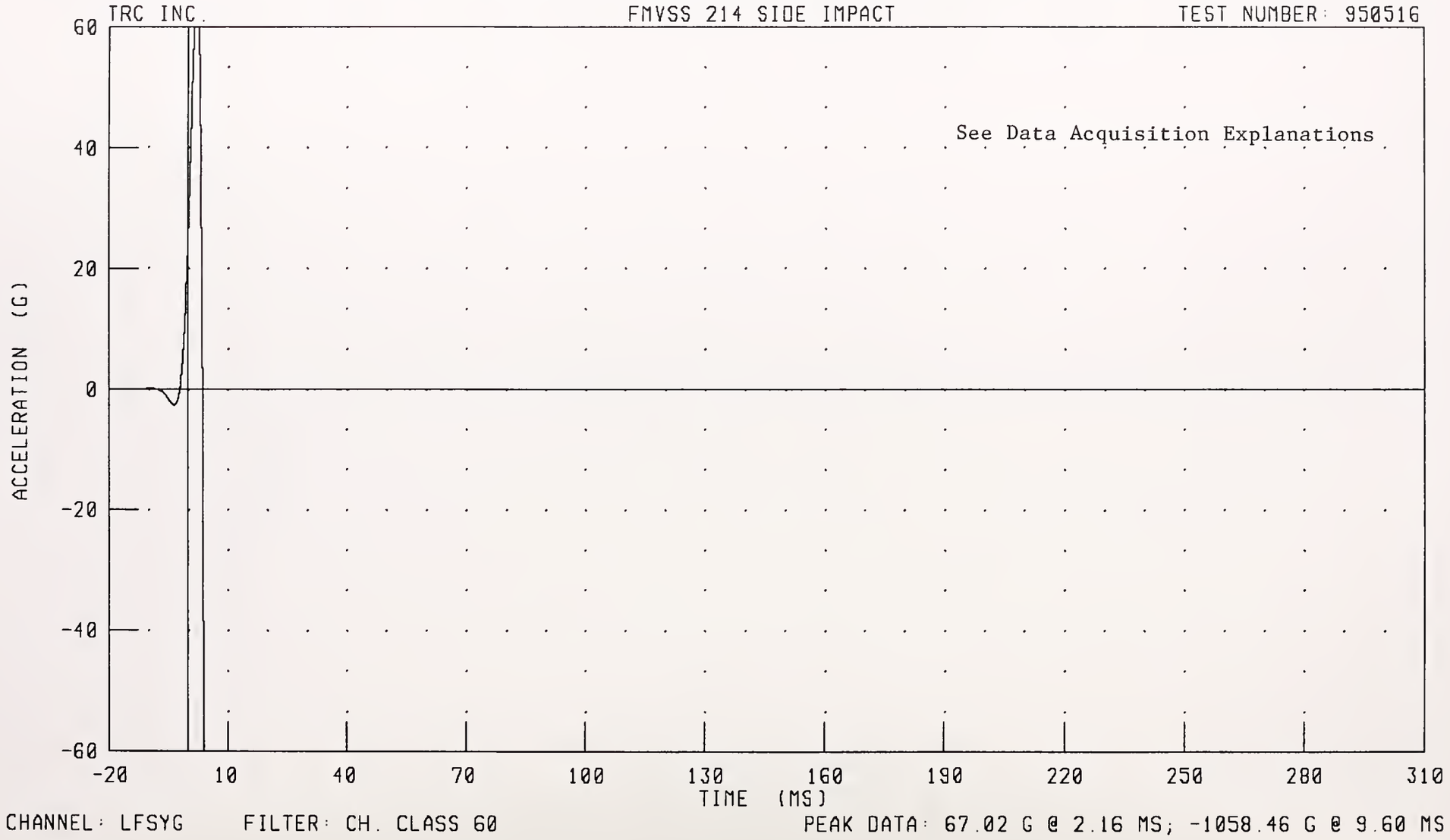
TRC INC FMVSS 214 SIDE IMPACT TEST NUMBER 950516



CHANNEL: LRSYG FILTER: CH. CLASS 60 PEAK DATA: 101.52 G @ 7.20 MS; -75.30 G @ 11.28 MS

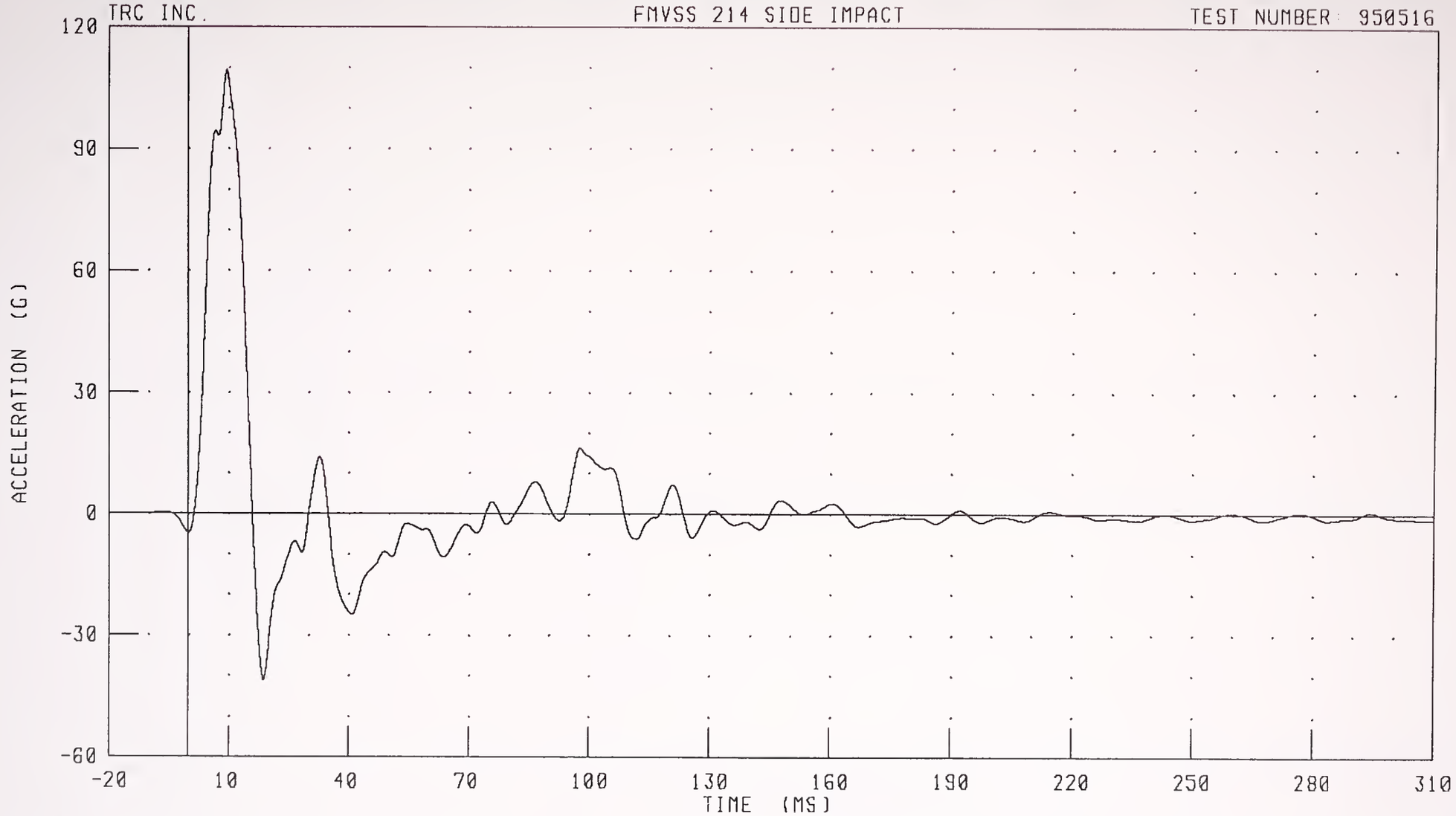
MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF SOLECTRIA FORCE

LEFT FRONT SILL Y-AXIS ACCELERATION



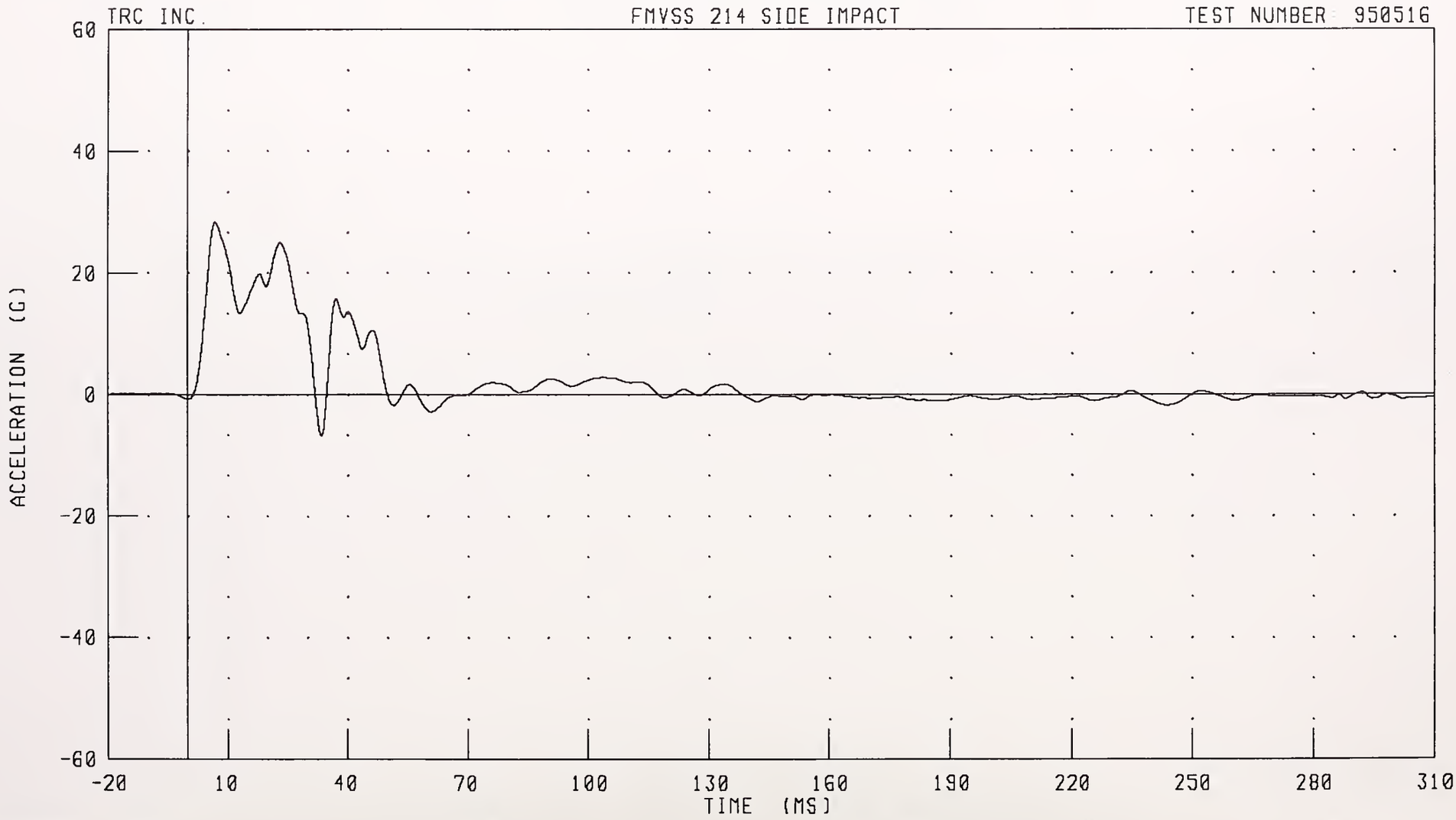
CHANNEL: LFSYG FILTER: CH. CLASS 60 PEAK DATA: 67.02 G @ 2.16 MS; -1058.46 G @ 9.60 MS

MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF SOLECTRIA FORCE
LEFT FRONT DOOR CENTERLINE Y-AXIS ACCELERATION



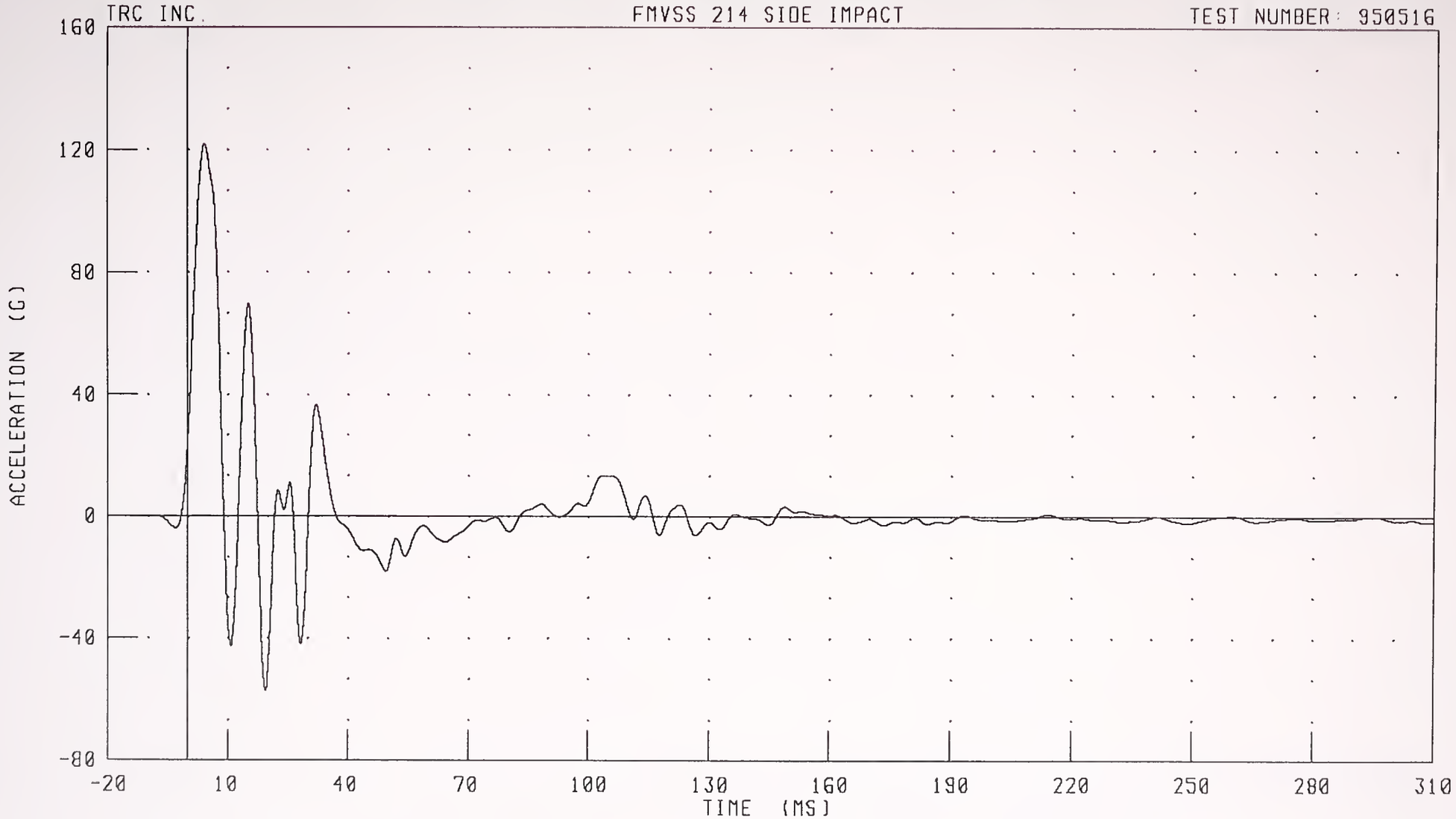
CHANNEL: LFDYG1 FILTER: CH. CLASS 60 PEAK DATA: 109.40 G @ 9.44 MS; -41.05 G @ 18.64 MS

MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF SOLECTRIA FORCE
RIGHT REAR SEAT Y-AXIS ACCELERATION



CHANNEL: TRRYG FILTER: CH. CLASS 60 PEAK DATA: 28.38 G @ 6.80 MS; -6.68 G @ 33.52 MS

MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF SOLECTRIA FORCE
LEFT FRONT DOOR MID-REAR Y-AXIS ACCELERATION

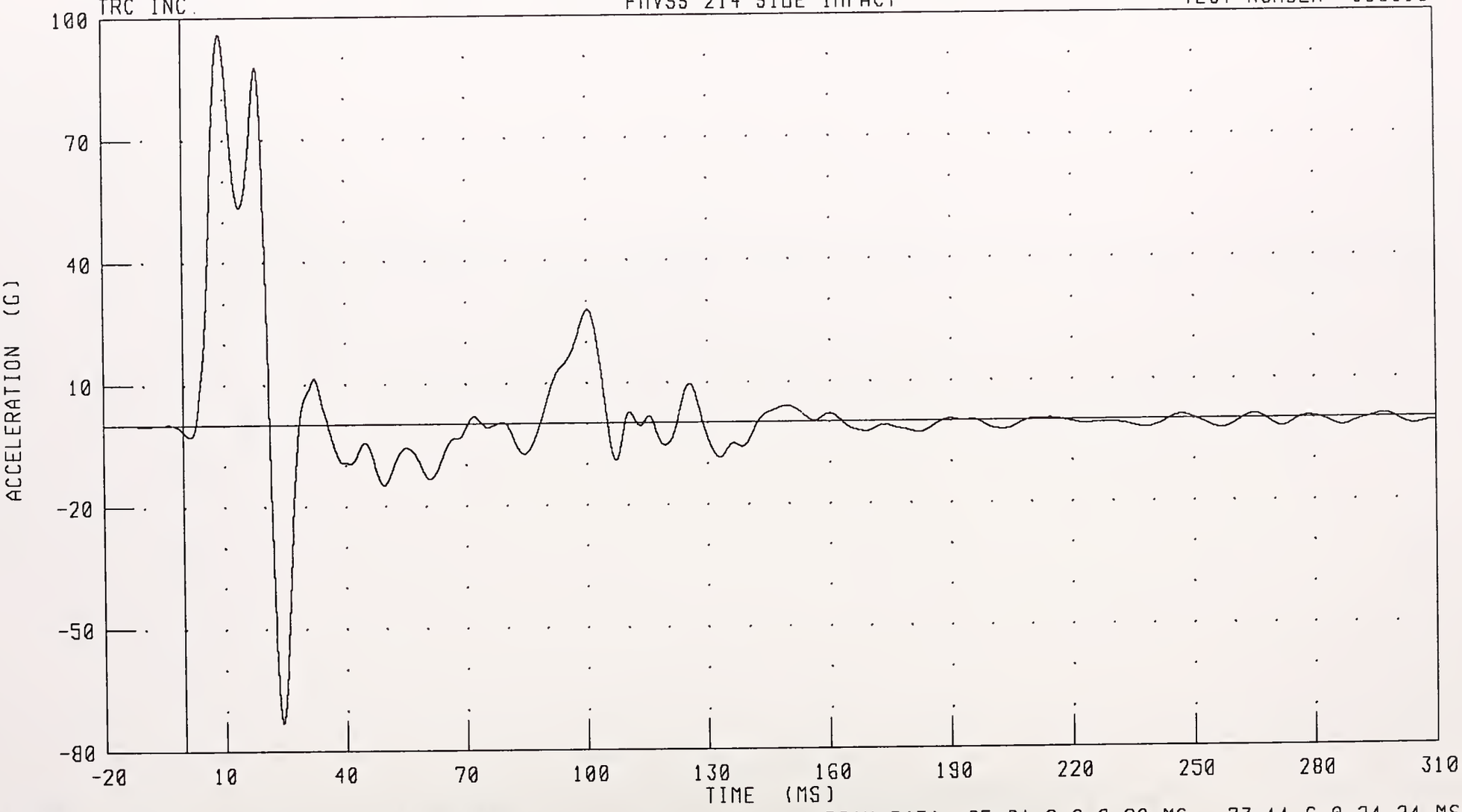


CHANNEL: LFDYG2 FILTER: CH. CLASS 60 PEAK DATA: 122.00 G @ 4.08 MS; -57.23 G @ 19.52 MS

MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF SOLECTRIA FORCE
LEFT FRONT DOOR UPPER CENTERLINE Y-AXIS ACCELERATION
FMVSS 214 SIDE IMPACT

TRC INC.

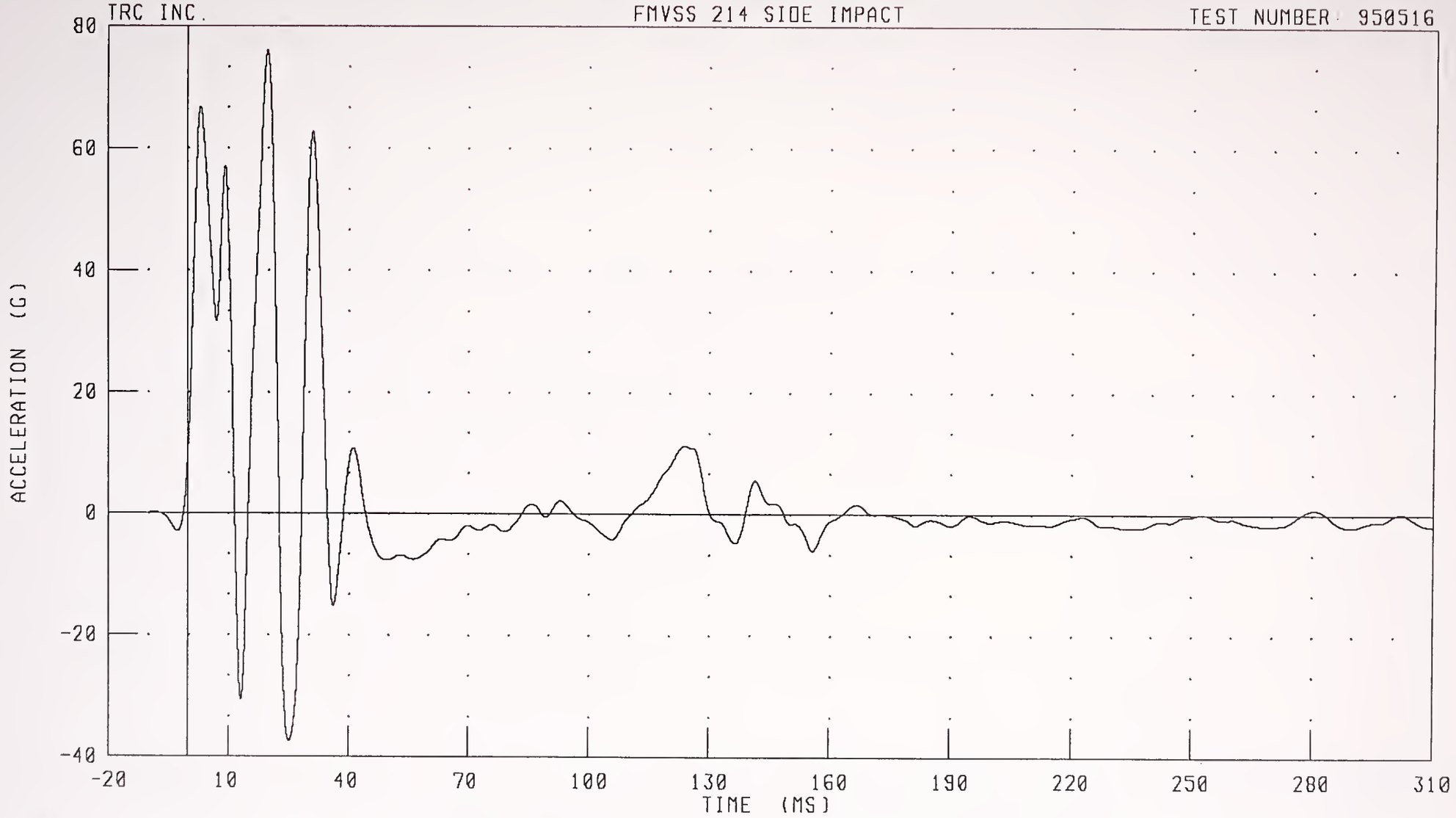
TEST NUMBER: 950516



CHANNEL: LFDYG3 FILTER: CH. CLASS 60

PEAK DATA: 95.81 G @ 9.20 MS; -73.11 G @ 24.24 MS

MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF SOLECTRIA FORCE
LEFT REAR DOOR MID-REAR Y-AXIS ACCELERATION



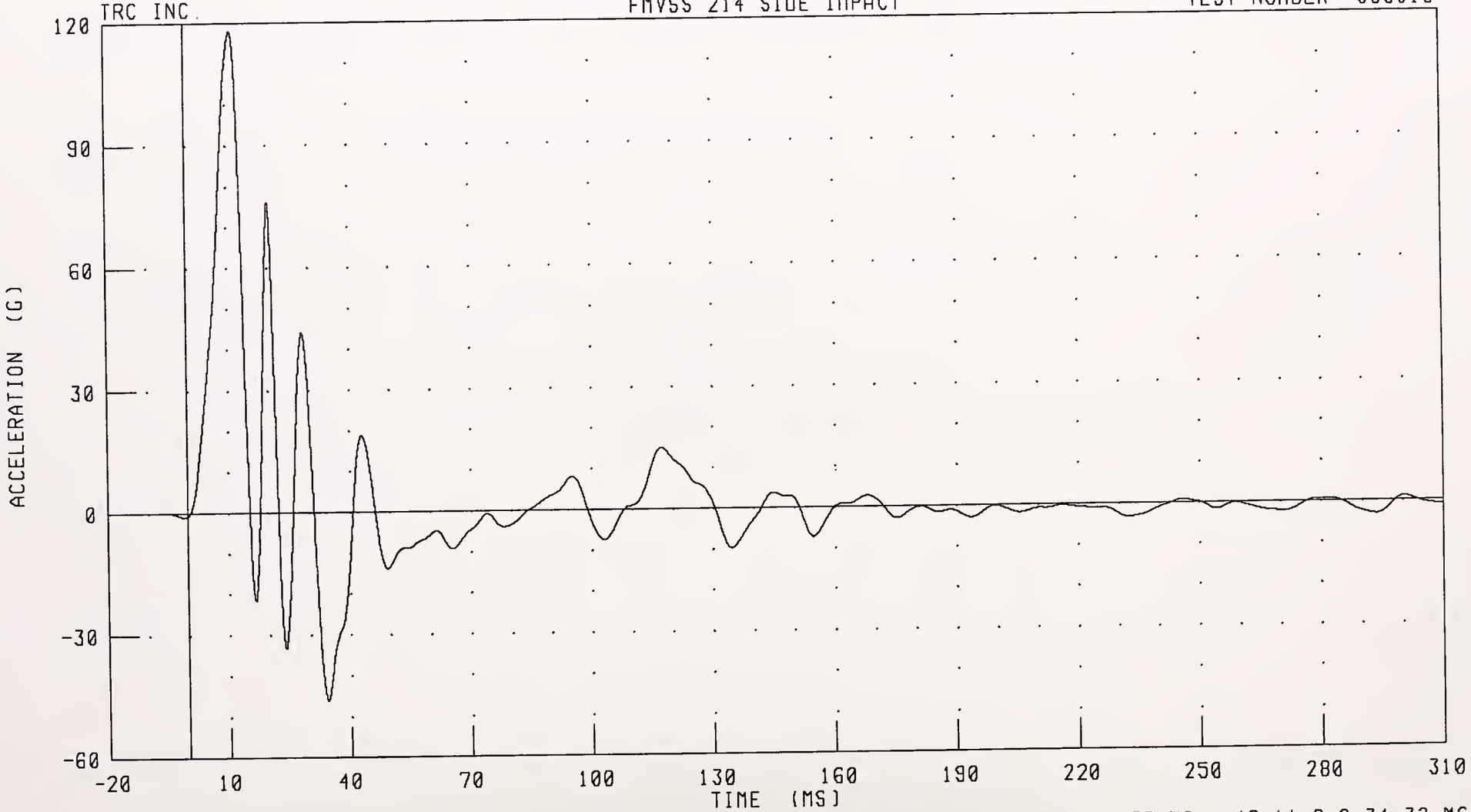
CHANNEL: LRDYG1 FILTER CH. CLASS 60

PEAK DATA: 76.04 G @ 19.84 MS, -37.34 G @ 25.20 MS

MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF SOLECTRIA FORCE
LEFT REAR DOOR UPPER CENTERLINE Y-AXIS ACCELERATION
FMVSS 214 SIDE IMPACT

TRC INC.

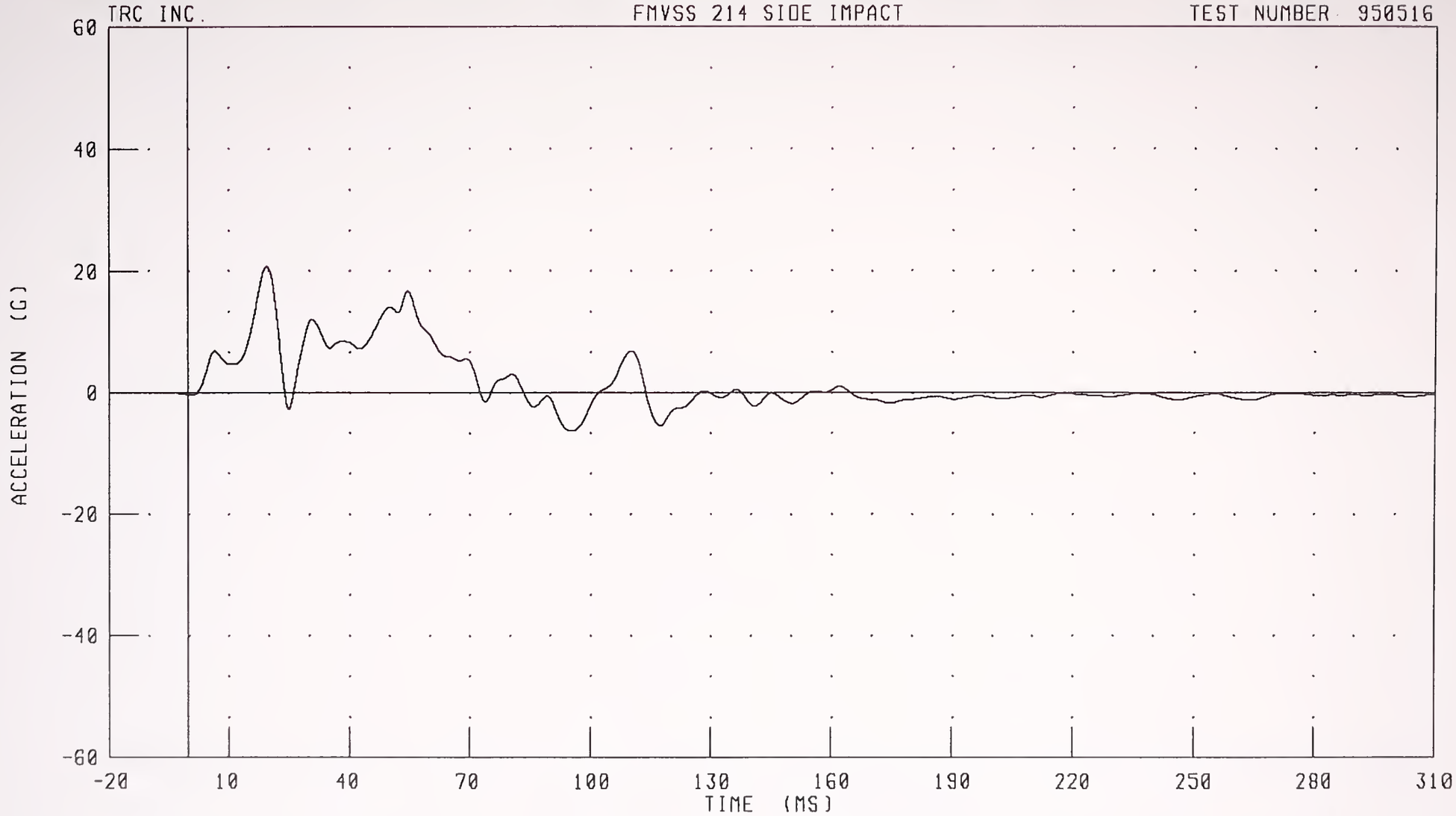
TEST NUMBER: 950516



CHANNEL: LRDYG2 FILTER: CH. CLASS 60

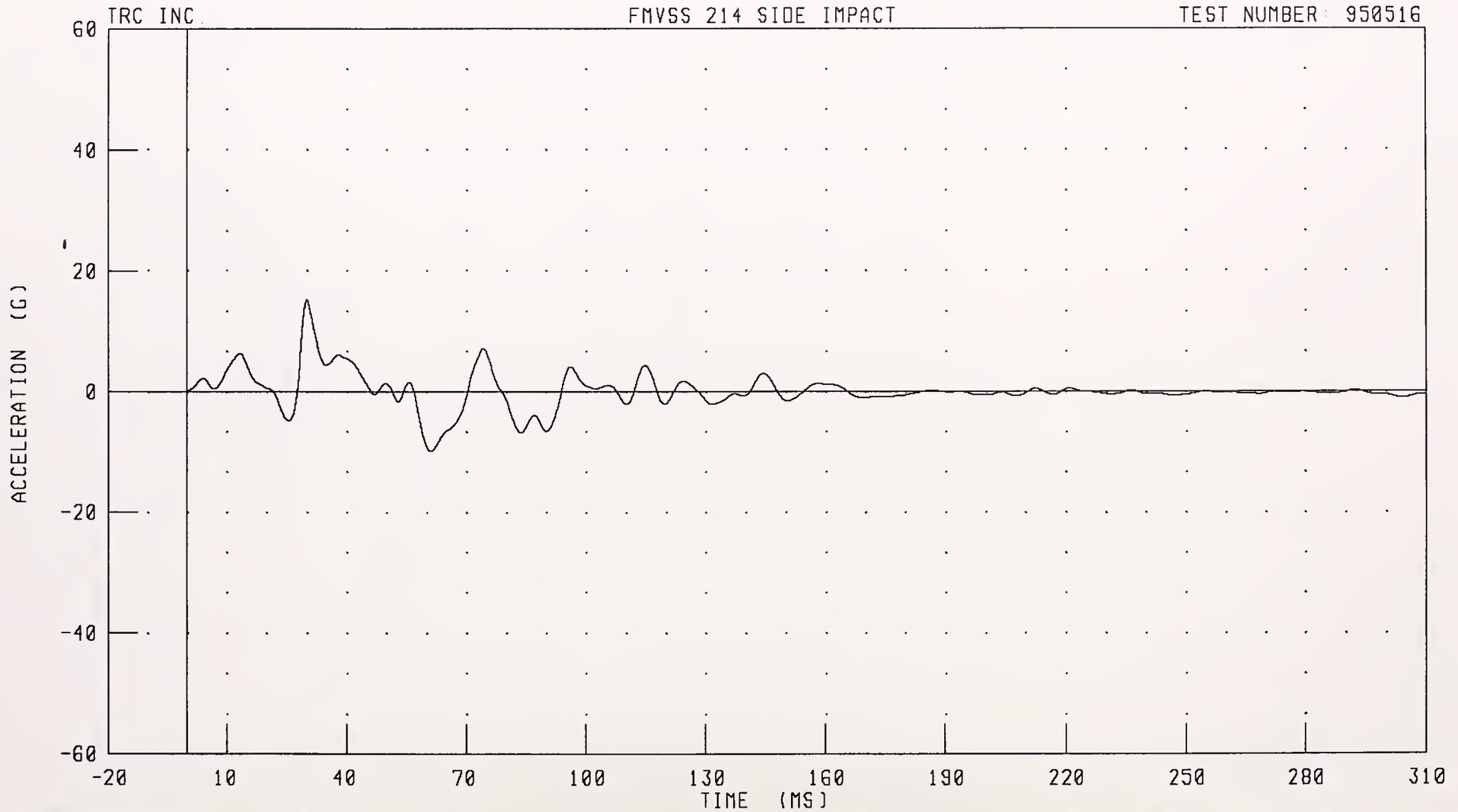
PEAK DATA: 117.91 G @ 11.28 MS; -46.11 G @ 34.32 MS

MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF SOLECTRIA FORCE
FRONT BATTERY BOX Y-AXIS ACCELERATION



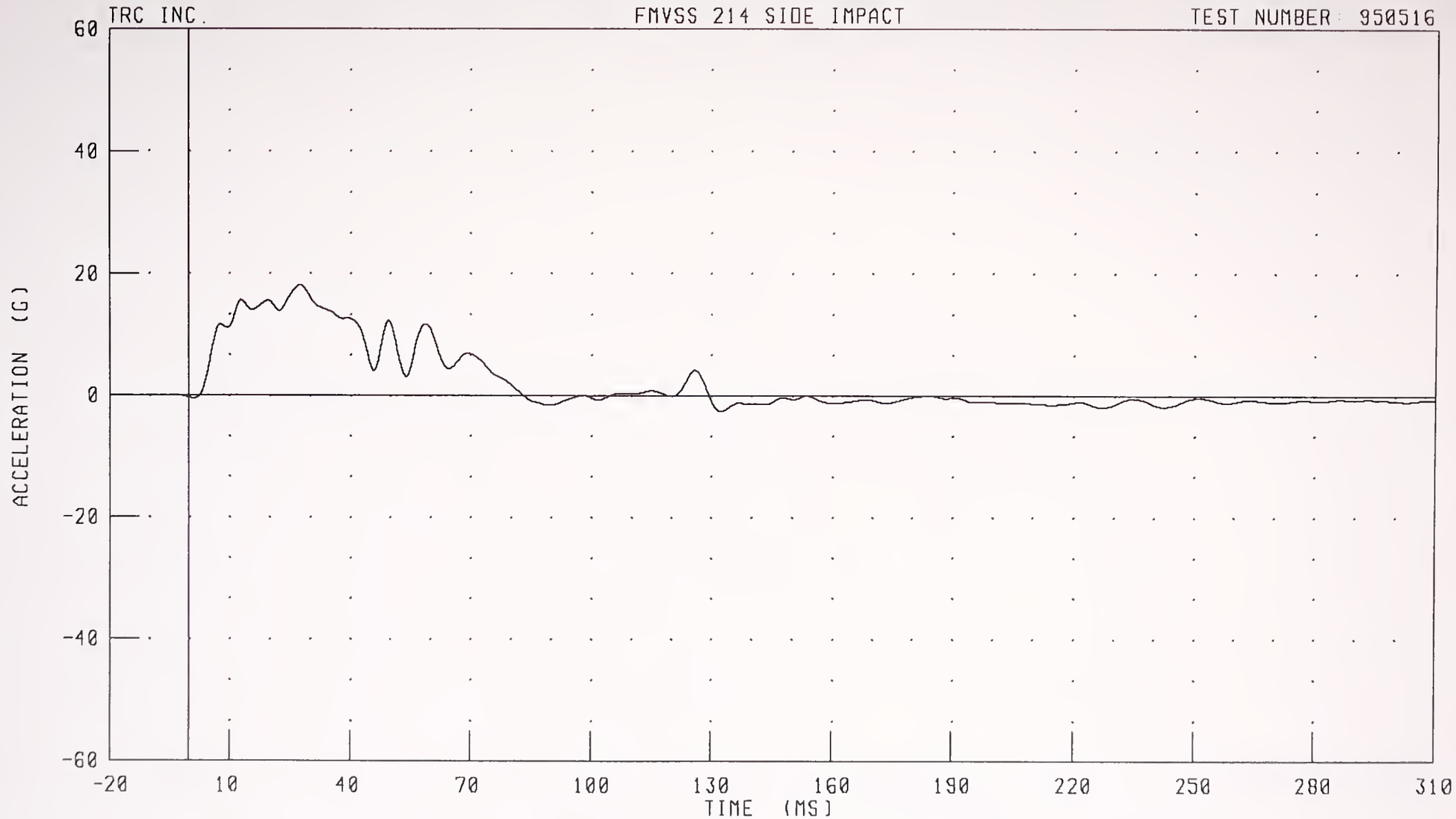
CHANNEL: FBBYG FILTER: CH CLASS 60 PEAK DATA: 20.76 G @ 19.52 MS; -6.29 G @ 95.36 MS

MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF SOLECTRIA FORCE
FRONT BATTERY BOX Z-AXIS ACCELERATION



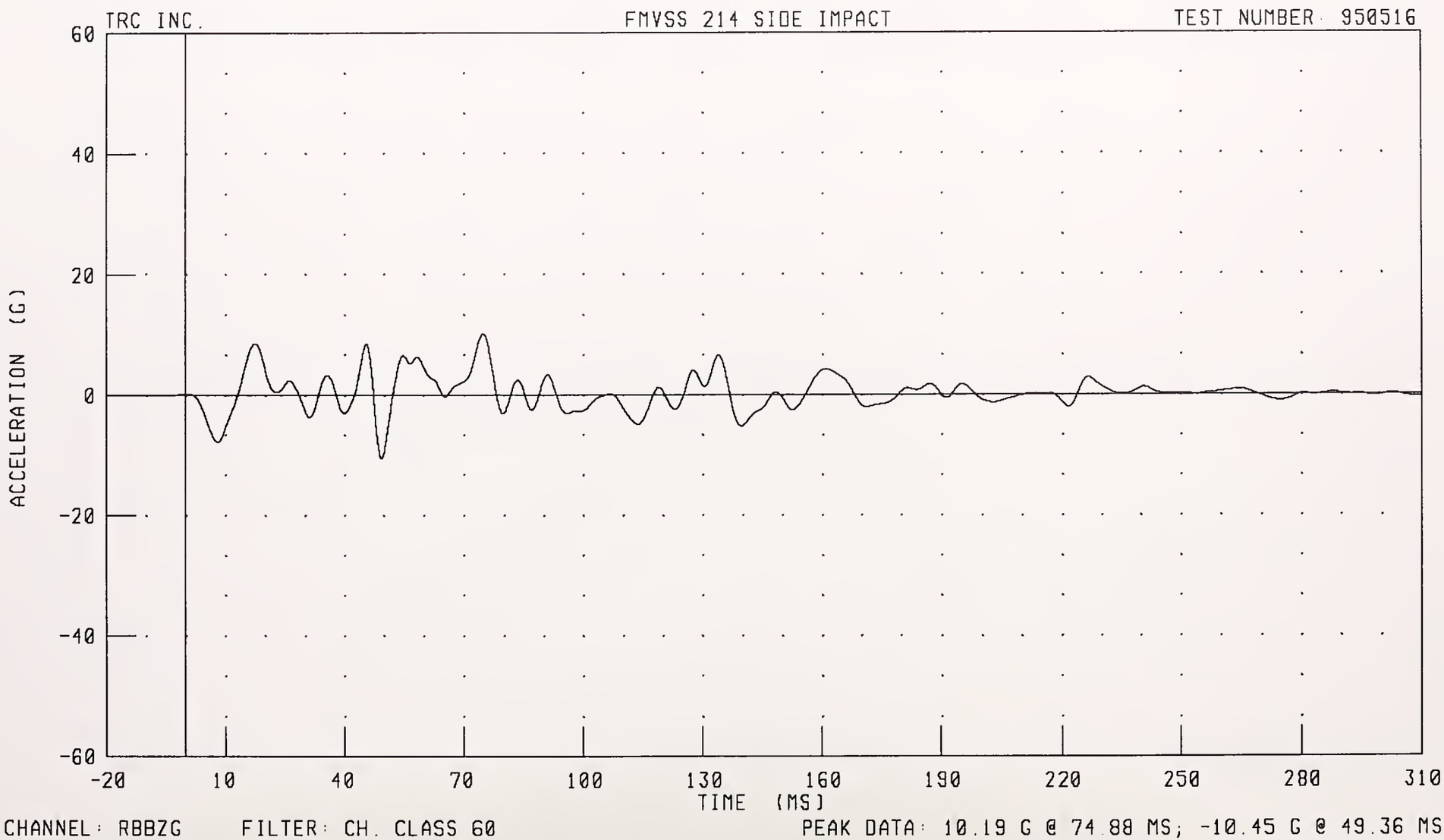
CHANNEL: FBBZG FILTER: CH. CLASS 60 PEAK DATA: 15.21 G @ 30.00 MS; -9.86 G @ 61.12 MS

MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF SOLECTRIA FORCE
REAR BATTERY BOX Y-AXIS ACCELERATION



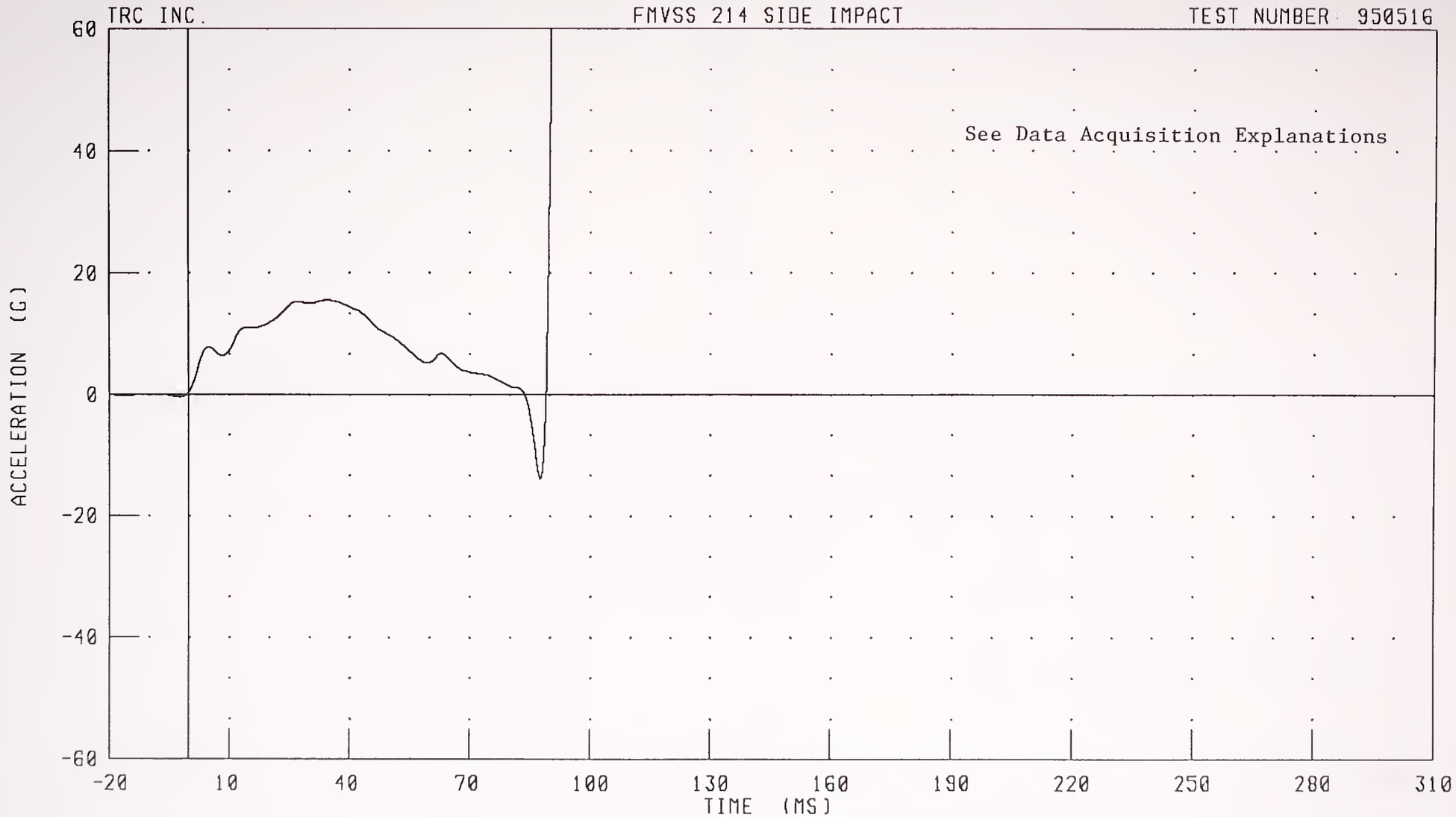
CHANNEL: RBBYG FILTER: CH. CLASS 60 PEAK DATA: 18.12 G @ 27.52 MS; -2.62 G @ 132.40 MS

MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF SOLECTRIA FORCE
REAR BATTERY BOX Z-AXIS ACCELERATION



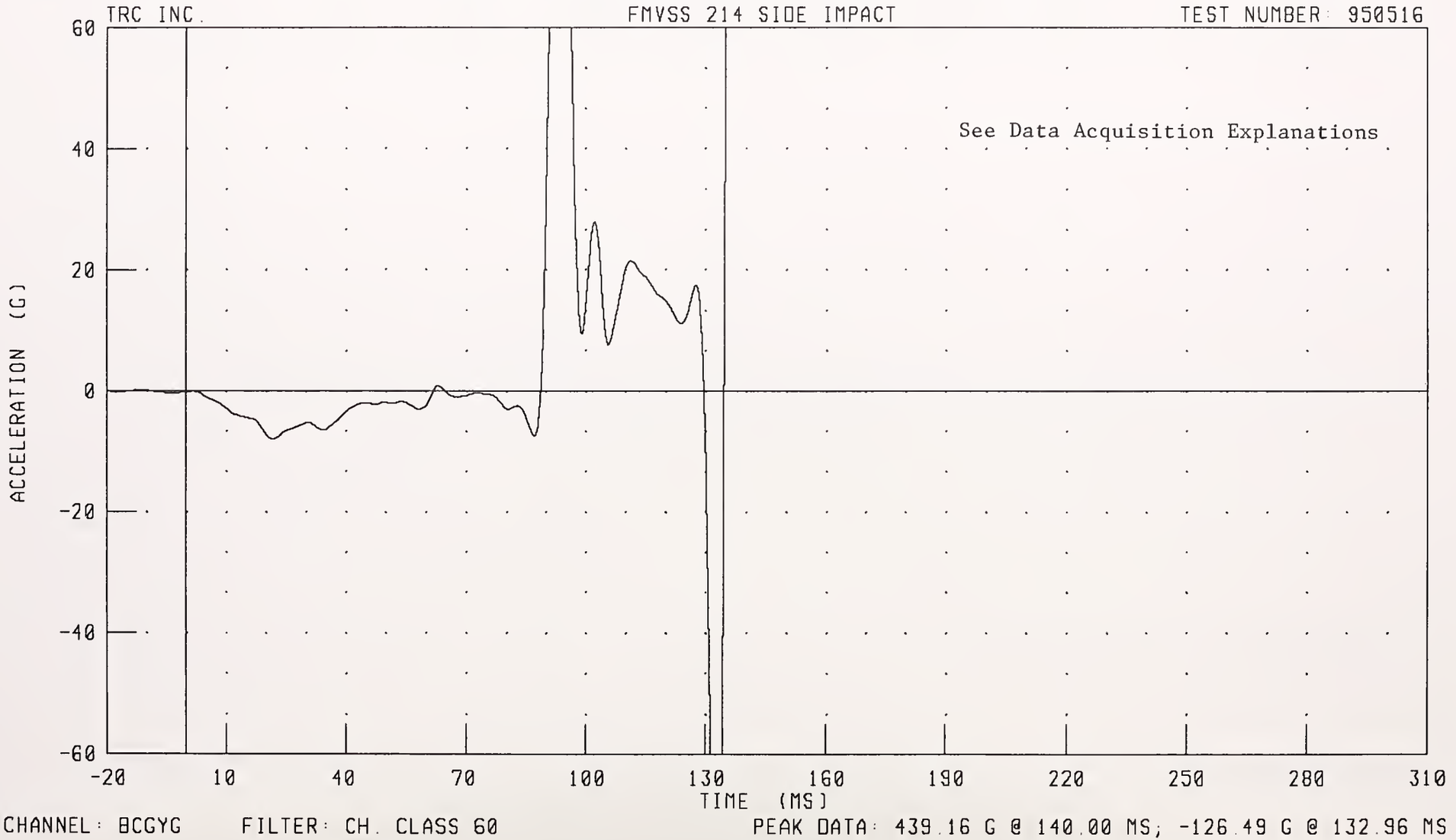
CHANNEL: RBBZG FILTER: CH. CLASS 60 PEAK DATA: 10.19 G @ 74.88 MS; -10.45 G @ 49.36 MS

MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF SOLECTRIA FORCE
MOVING BARRIER CENTER OF GRAVITY X-AXIS ACCELERATION



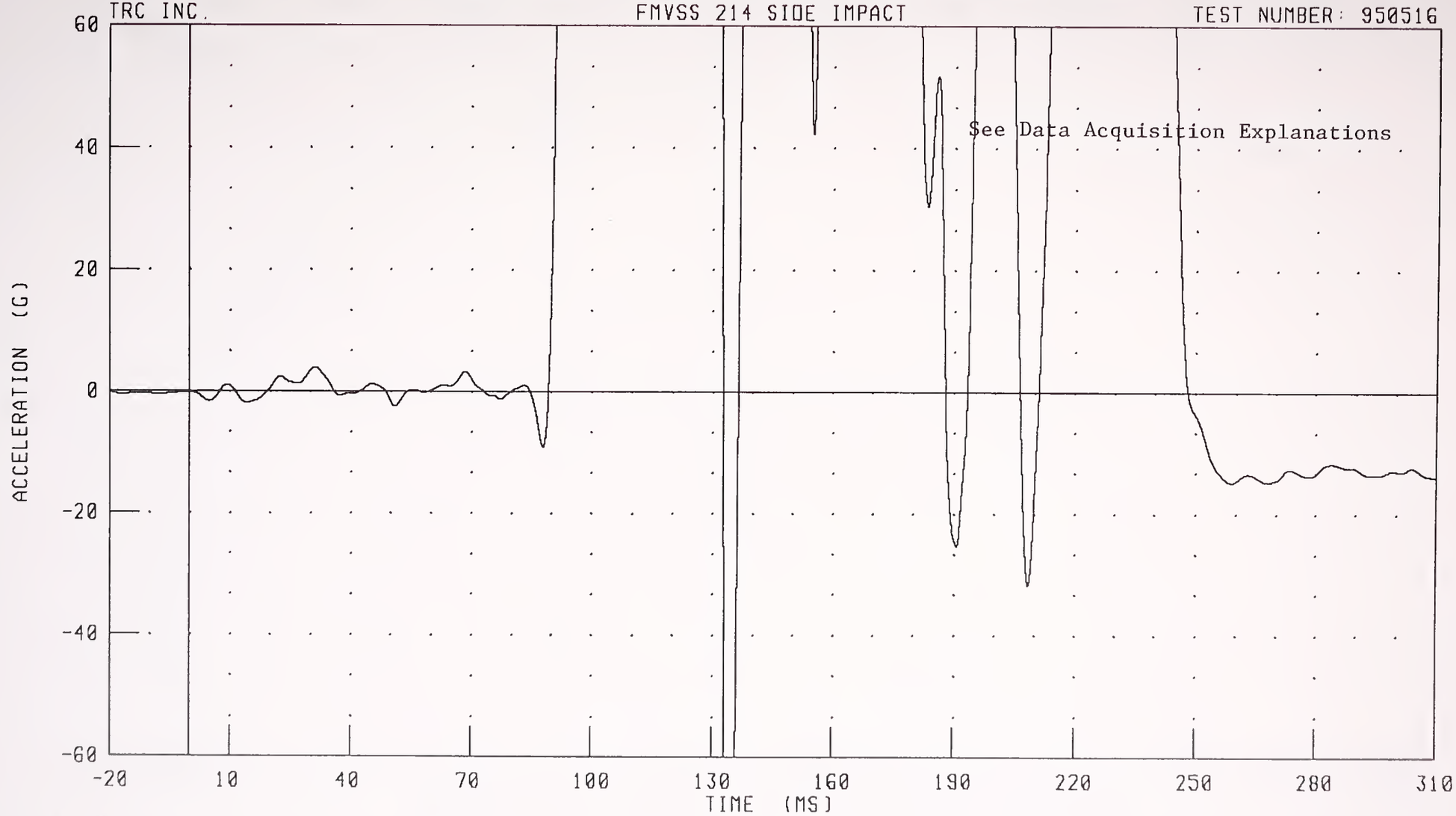
CHANNEL: BCGXG FILTER: CH. CLASS 60 PEAK DATA: 425.58 G @ 283.76 MS; -13.86 G @ 87.68 MS

MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF SOLECTRIA FORCE
MOVING BARRIER CENTER OF GRAVITY Y-AXIS ACCELERATION



CHANNEL: BCGYG FILTER: CH. CLASS 60 PEAK DATA: 439.16 G @ 140.00 MS; -126.49 G @ 132.96 MS

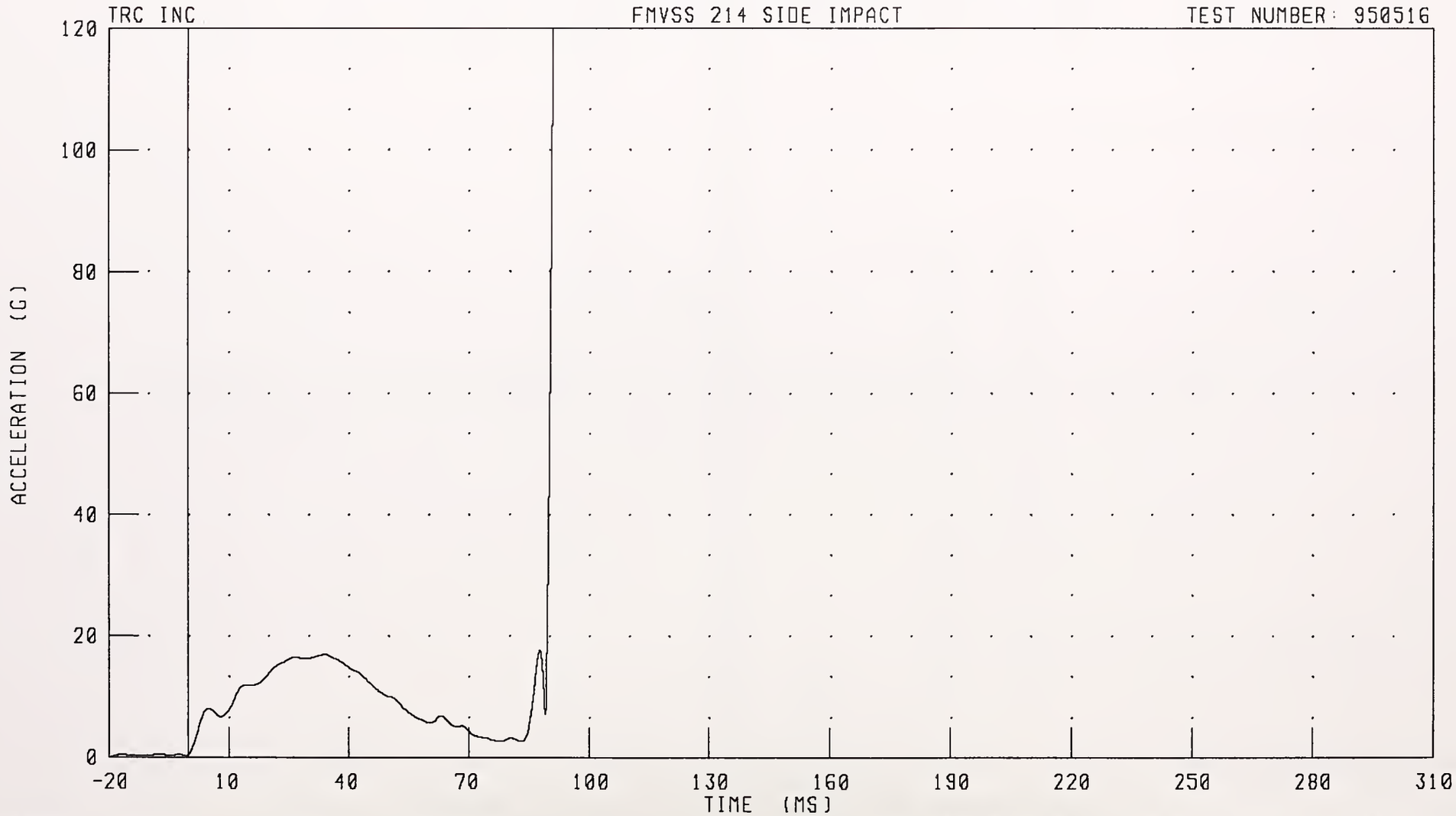
MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF SOLECTRIA FORCE
MOVING BARRIER CENTER OF GRAVITY Z-AXIS ACCELERATION



CHANNEL: BCGZG FILTER: CH. CLASS 60

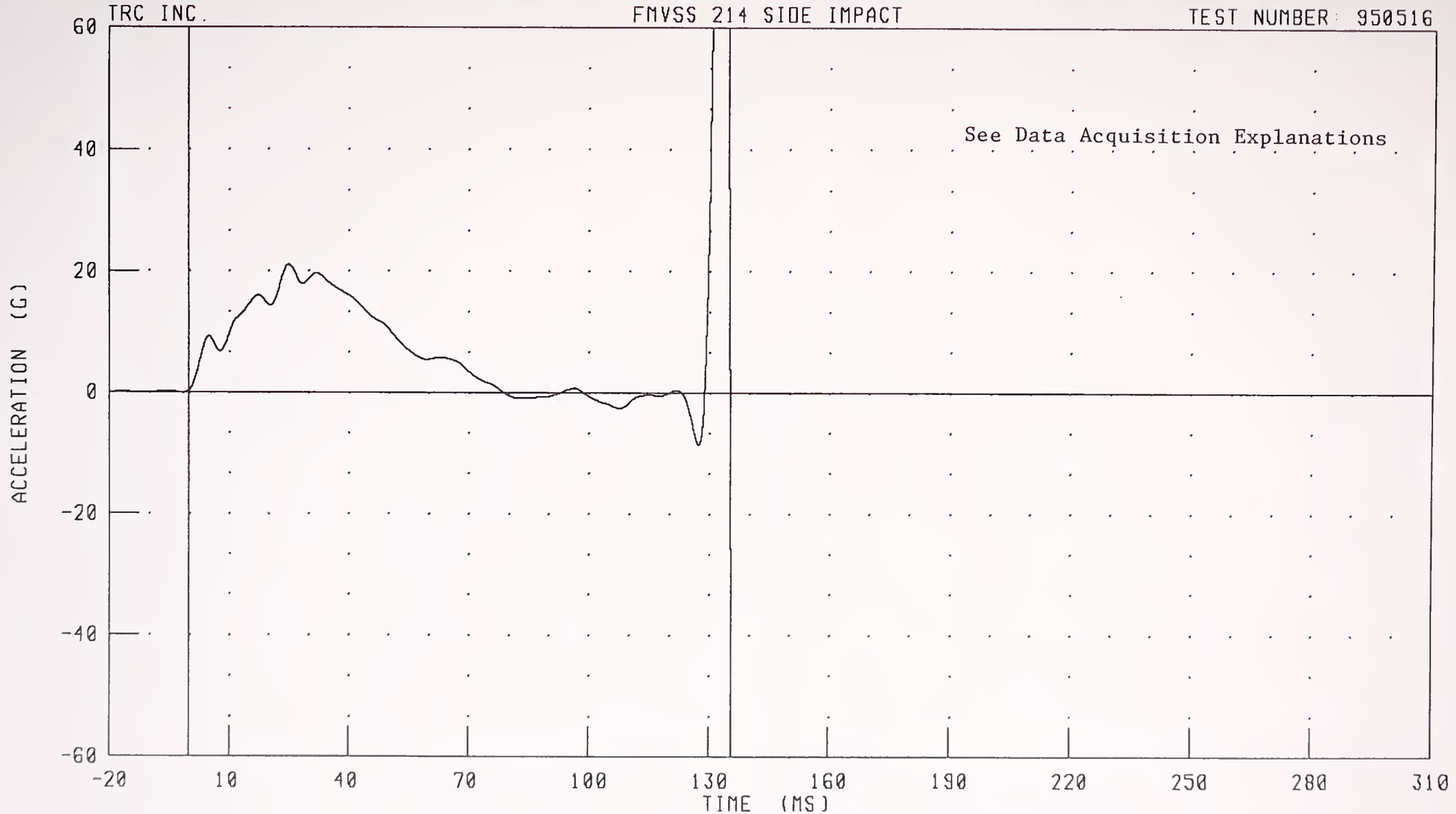
PEAK DATA: 325.11 G @ 141.04 MS; -143.52 G @ 134.32 MS

MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF SOLECTRIA FORCE
MOVING BARRIER CENTER OF GRAVITY RESULTANT ACCELERATION



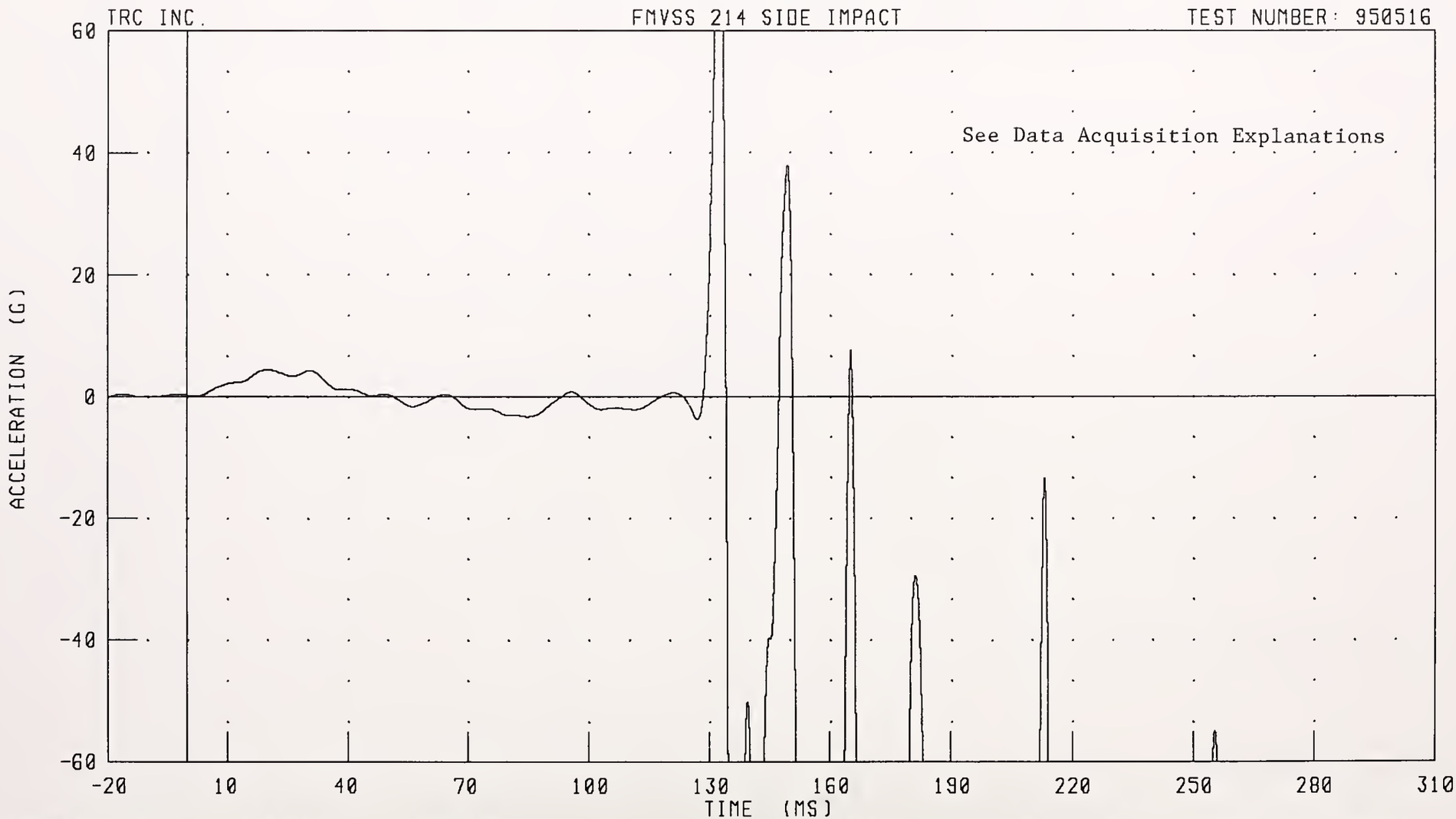
CHANNEL: BCGRG FILTER: CH. CLASS 60 PEAK DATA: 606.03 G @ 140.48 MS; 0.02 G @ -19.92 MS

MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF SOLECTRIA FORCE
MOVING BARRIER LEFT REAR FRAME RAIL X-AXIS ACCELERATION



CHANNEL: BSRXG FILTER: CH. CLASS 60 PEAK DATA: 171.48 G @ 133.04 MS; -401.60 G @ 141.12 MS

MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF SOLECTRIA FORCE
MOVING BARRIER LEFT REAR FRAME RAIL Y-AXIS ACCELERATION



CHANNEL: BSRYG FILTER: CH. CLASS 60 PEAK DATA: 84.07 G @ 132.56 MS; -405.62 G @ 269.04 MS

Appendix C

Dummy Calibration Data

Pre-test Certification Data

Driver Dummy Serial Number: 199

TRANSPORTATION RESEARCH CENTER INC.
SIDE IMPACT DUMMY
EXTERNAL DIMENSIONS
LEFT SIDE CONFIGURATION
SN 199 FIRST TECHNOLOGY

12-MAY-95

TRC INC. TEST NO: ED19925 572F SN199 EXT.DIMENSION CAL25

DIMENSIONS WITH CHEST JACKET INSTALLED			
SYMB	DESCRIPTION	SPECIFICATION	TEST RESULTS
	TEMPERATURE		21.1 DEG. C
	RELATIVE HUMIDITY		50.0 %
SH	SEATED HEIGHT	889 - 909 MM	894.1 MM
HP	HIP PIVOT HEIGHT	99 MM	REFERENCE
KH	KNEE PIVOT FROM BACKLINE	511 - 526 MM	520.7 MM
KV	KNEE PIVOT FROM FLOOR	490 - 506 MM	490.2 MM
HW	HIP WIDTH	356 - 391 MM	386.1 MM

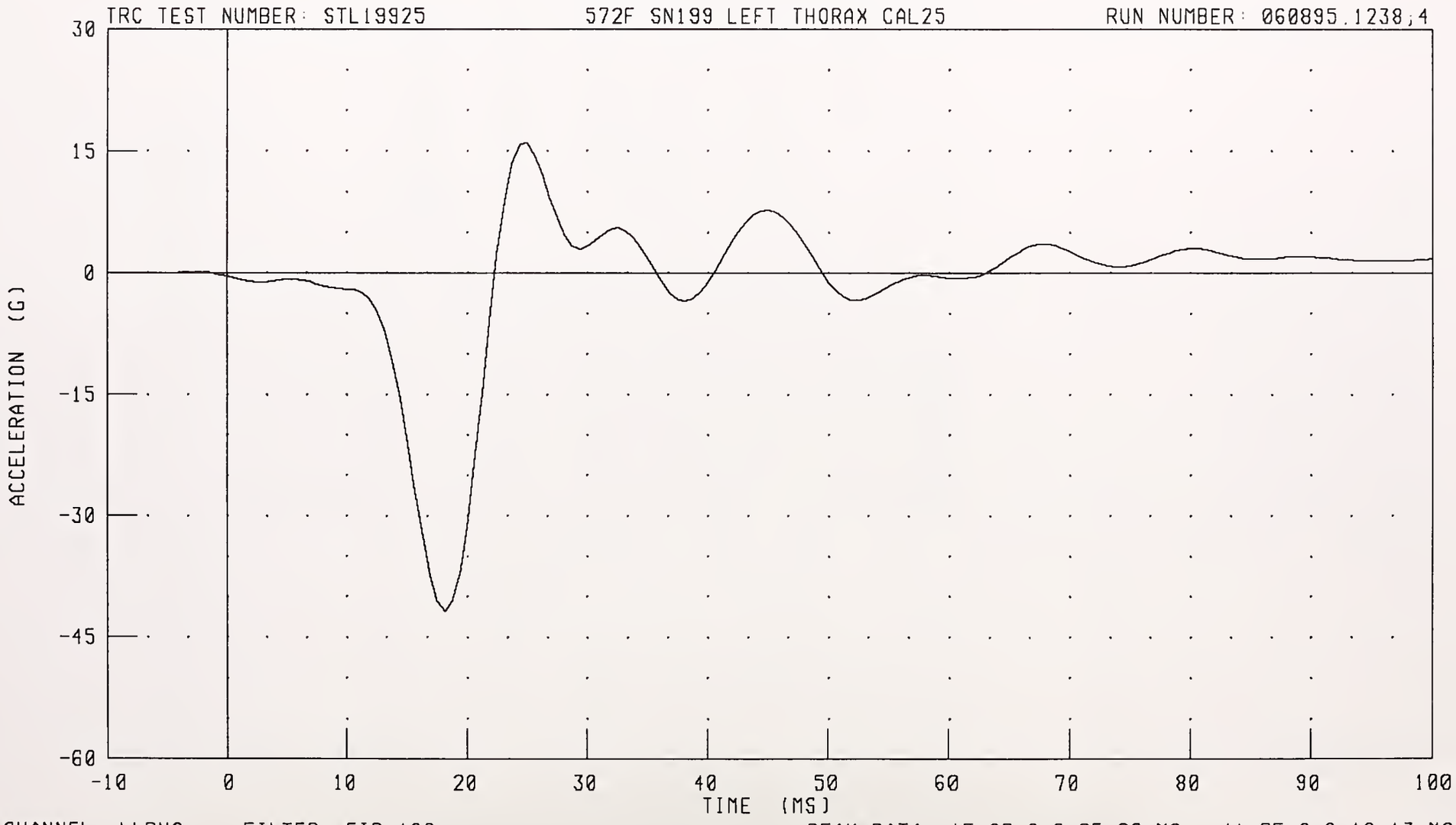
DIMENSIONS WITH CHEST JACKET REMOVED			
SYMB	DESCRIPTION	SPECIFICATION	TEST RESULTS
RH	RIB HEIGHT	501 - 520 MM	508.0 MM
RD	RIB FROM BACKLINE	229 - 241 MM	241.3 MM
RW-1	TOP RIB WIDTH FROM C/L	165. - 180 MM	175.3 MM
RW-2	BOTTOM RIB WIDTH FROM C/L	165 - 180 MM	175.3 MM
	DIFFERENCE BETWEEN TOP & BOTTOM RIB WIDTH FROM C/L	$\leq$ 2.5 MM	0.0 MM

DUMMY MEETS SPECIFICATIONS

TECHNICIAN

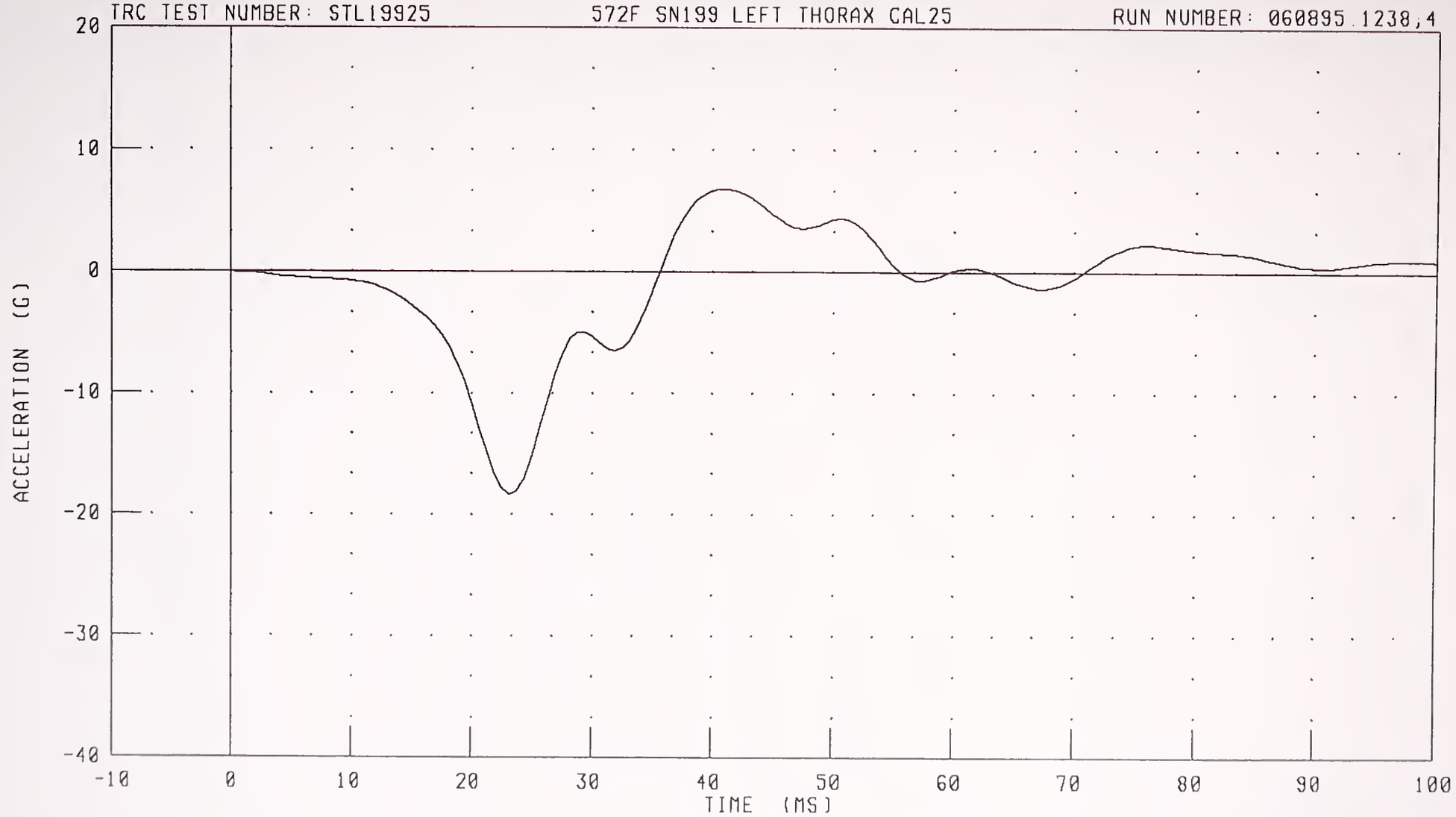
RUN NUMBER: 051795.1243

PART 572-F S.I.D. THORAX CALIBRATION - (LEFT SIDE IMPACT)
LEFT LOWER RIB ACCELERATION Y AXIS



CHANNEL: LLRYG FILTER: FIR 100 PEAK DATA: 15.97 G @ 25.00 MS; -41.75 G @ 18.13 MS

PART 572-F S.I.D. THORAX CALIBRATION - (LEFT SIDE IMPACT)
LOWER SPINE ACCELERATION Y AXIS



CHANNEL: T12YG FILTER: FIR 100

PEAK DATA: 6.78 G @ 41.25 MS; -18.38 G @ 23.13 MS

TRANSPORTATION RESEARCH CENTER INC.

LATERAL PELVIS IMPACT TEST

SIDE IMPACT DUMMY 12-MAY-95

LEFT SIDE CONFIGURATION

TRC INC. TEST NO: SPL19925 572F SN199 LEFT PELVIS CAL25

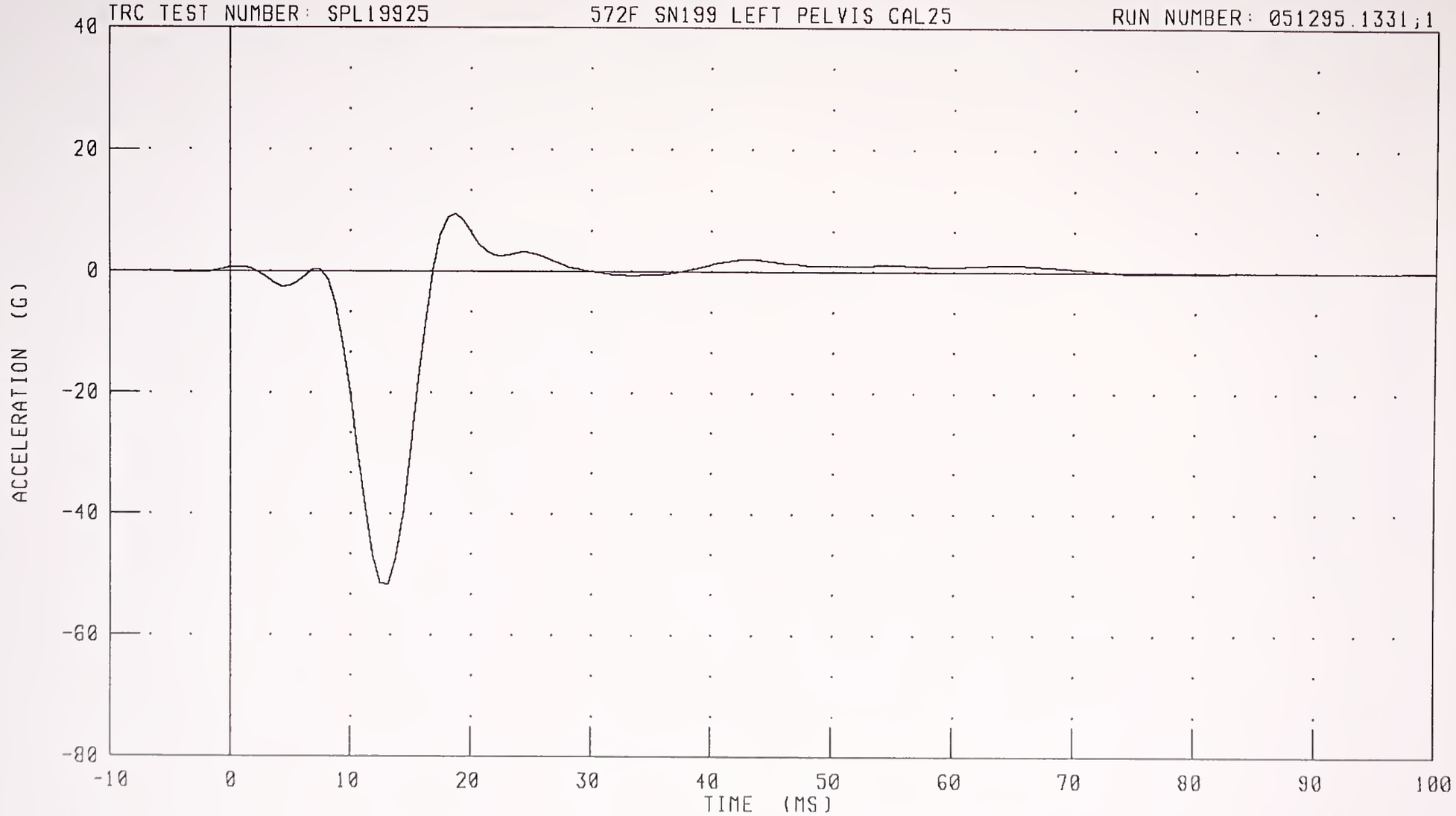
TEST PARAMETER	SPECIFICATION (ABSOLUTE VALUE)	TEST RESULTS
TEMPERATURE	18.9 - 25.5 C	21.1 DEG. C
RELATIVE HUMIDITY	10 - 70 %	50.0 %
PENDULUM VELOCITY	4.21 - 4.32 M/S	4.28 M/S
PEAK PELVIC ACCELERATION	40 - 60 G	-51.7 G
TIME ABOVE 20 G LEVEL	3 - 7 MS	5.6 MS
IS ACCELERATION CURVE UNIMODAL?	YES	YES

TEST MEETS SPECIFICATIONS

TECHNICIAN _____ RUN NUMBER: 051295.1331;1

PART 572-F S.I.D. PELVIS CALIBRATION - (LEFT SIDE IMPACT)

PELVIS ACCELERATION Y AXIS



CHANNEL PEVYG FILTER FIR 100

PEAK DATA: 9 45 G @ 18 75 MS; -51 67 G @ 13 13 MS

Pre-test Certification Data

Passenger Dummy Serial Number: 191

TRANSPORTATION RESEARCH CENTER INC.
SIDE IMPACT DUMMY
EXTERNAL DIMENSIONS
LEFT SIDE CONFIGURATION
SN 191 FIRST TECHNOLOGY

12-MAY-95

TRC INC. TEST NO: ED19127 572F SN191 EXT.DIMENSION CAL27

DIMENSIONS WITH CHEST JACKET INSTALLED			
SYMB	DESCRIPTION	SPECIFICATION	TEST RESULTS
	TEMPERATURE		21.1 DEG. C
	RELATIVE HUMIDITY		50.0 %
SH	SEATED HEIGHT	889 - 909 MM	899.2 MM
HP	HIP PIVOT HEIGHT	99 MM	REFERENCE
KH	KNEE PIVOT FROM BACKLINE	511 - 526 MM	525.8 MM
KV	KNEE PIVOT FROM FLOOR	490 - 506 MM	495.3 MM
HW	HIP WIDTH	356 - 391 MM	363.2 MM

DIMENSIONS WITH CHEST JACKET REMOVED			
SYMB	DESCRIPTION	SPECIFICATION	TEST RESULTS
RH	RIB HEIGHT	501 - 520 MM	515.6 MM
RD	RIB FROM BACKLINE	229 - 241 MM	236.2 MM
RW-1	TOP RIB WIDTH FROM C/L	165. - 180 MM	172.7 MM
RW-2	BOTTOM RIB WIDTH FROM C/L	165 - 180 MM	172.7 MM
	DIFFERENCE BETWEEN TOP & BOTTOM RIB WIDTH FROM C/L	$\leq$ 2.5 MM	0.0 MM

DUMMY MEETS SPECIFICATIONS

TECHNICIAN Peter Foster

RUN NUMBER: 051795.1245

TRANSPORTATION RESEARCH CENTER INC.

LATERAL THORAX IMPACT TEST

SIDE IMPACT DUMMY 12-MAY-95

LEFT SIDE CONFIGURATION

TRC INC. TEST NO: STL19127 572F SN191 LEFT THORAX CAL27

TEST PARAMETER	SPECIFICATION (ABSOLUTE VALUE)	TEST RESULTS
TEMPERATURE	18.9 - 25.5 C	21.1 DEG. C
RELATIVE HUMIDITY	10 - 70 %	50.0 %
PENDULUM VELOCITY	4.21 - 4.32 M/S	4.22 M/S
PEAK ACCELERATION: UPPER RIB BAR	37 - 46 G	-41.4 G
PEAK ACCELERATION: LOWER RIB BAR	37 - 46 G	-40.6 G
PEAK ACCELERATION: LOWER THORACIC SPINE	15 - 22 G	-17.3 G

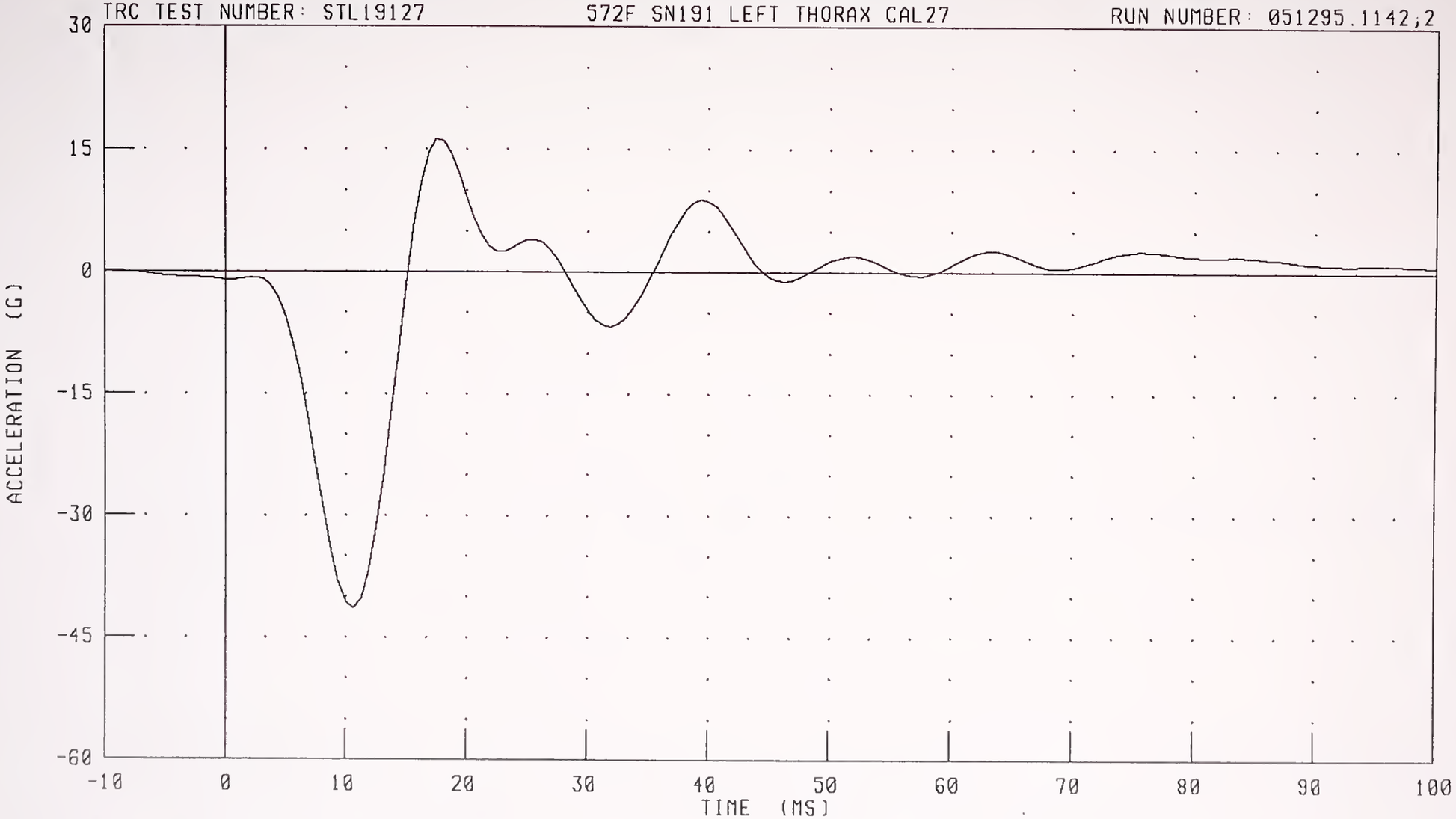
TEST MEETS SPECIFICATIONS

TECHNICIAN Pete Fox RUN NUMBER: 051295.1142;2

PART 572-F S.I.D. THORAX CALIBRATION - (LEFT SIDE IMPACT)

LEFT UPPER RIB ACCELERATION Y AXIS

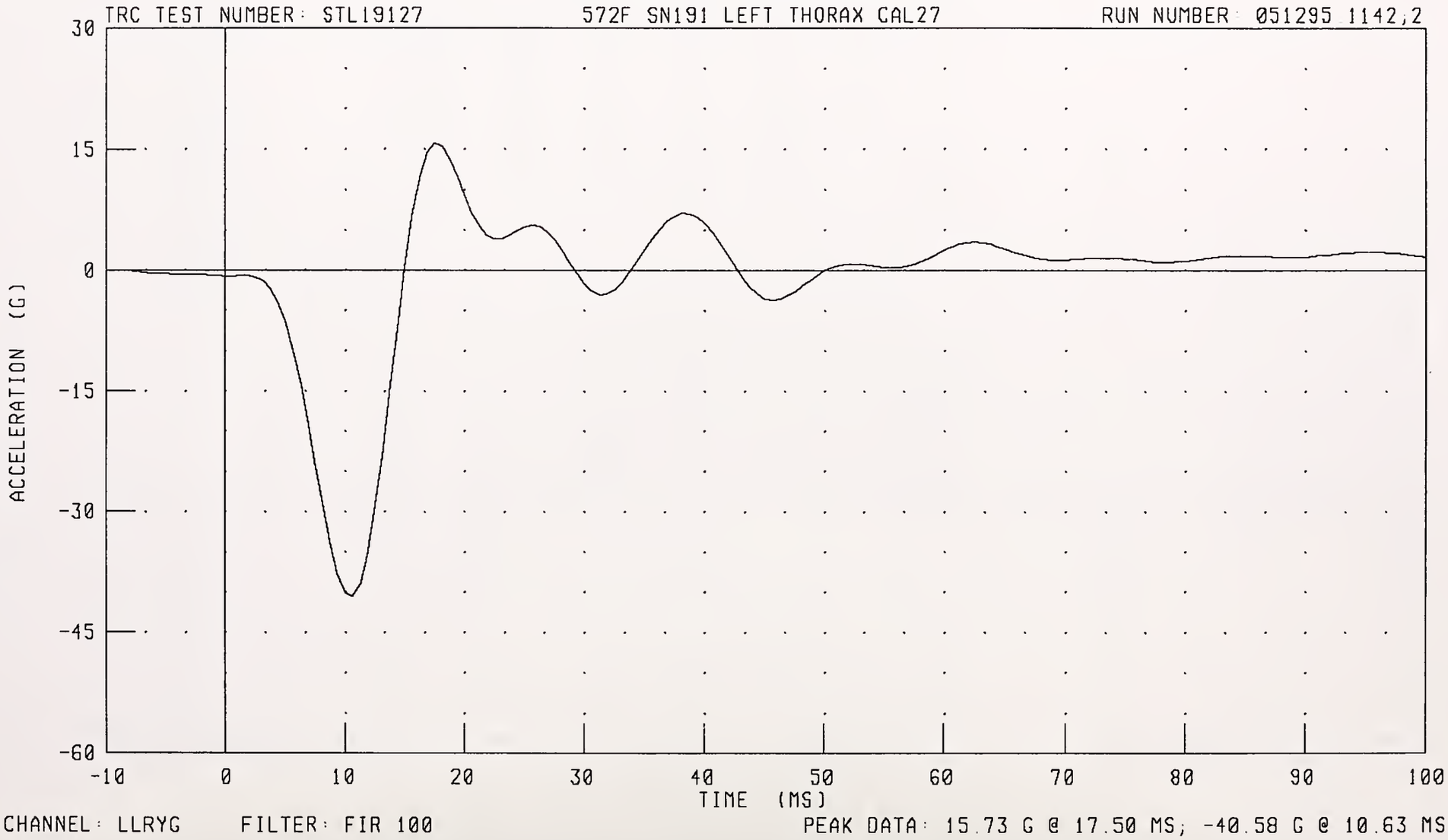
TRC TEST NUMBER: STL19127 572F SN191 LEFT THORAX CAL27 RUN NUMBER: 051295.1142;2



CHANNEL: LURYG FILTER: FIR 100

PEAK DATA: 16.24 G @ 17.50 MS; -41.44 G @ 10.63 MS

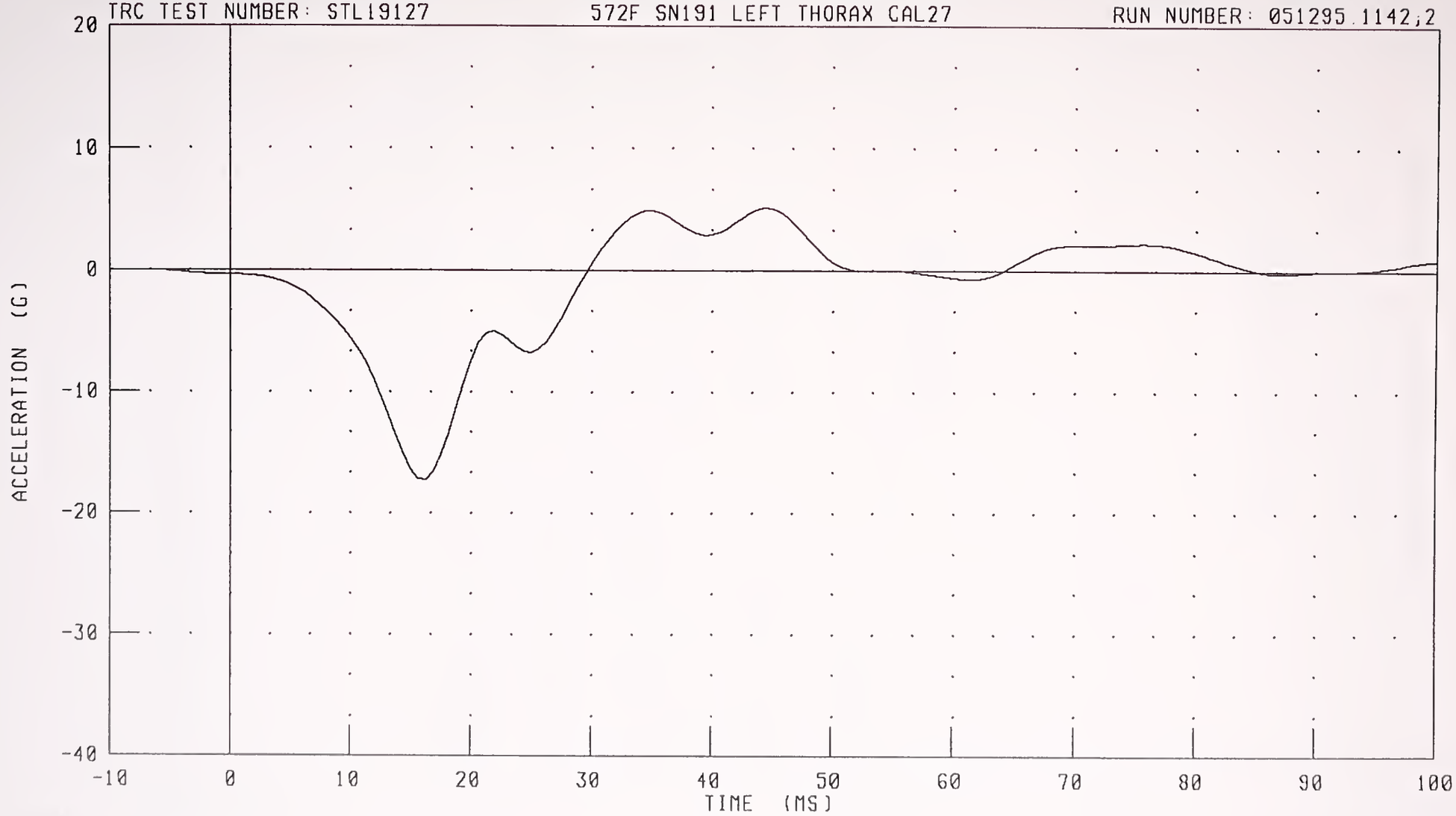
PART 572-F S.I.D. THORAX CALIBRATION - (LEFT SIDE IMPACT)
LEFT LOWER RIB ACCELERATION Y AXIS



CHANNEL: LLRYG FILTER: FIR 100

PEAK DATA: 15.73 G @ 17.50 MS; -40.58 G @ 10.63 MS

PART 572-F S.I.D. THORAX CALIBRATION - (LEFT SIDE IMPACT)
LOWER SPINE ACCELERATION Y AXIS



CHANNEL: T12YG FILTER FIR 100

PEAK DATA: 5.16 G @ 44.38 MS; -17.26 G @ 16.25 MS

TRANSPORTATION RESEARCH CENTER INC.

LATERAL PELVIS IMPACT TEST

SIDE IMPACT DUMMY 12-MAY-95

LEFT SIDE CONFIGURATION

TRC INC. TEST NO: SPL19127 572F SN191 LEFT PELVIS CAL27

TEST PARAMETER	SPECIFICATION (ABSOLUTE VALUE)	TEST RESULTS
TEMPERATURE	18.9 - 25.5 C	21.1 DEG. C
RELATIVE HUMIDITY	10 - 70 %	50.0 %
PENDULUM VELOCITY	4.21 - 4.32 M/S	4.29 M/S
PEAK PELVIC ACCELERATION	40 - 60 G	-43.8 G
TIME ABOVE 20 G LEVEL	3 - 7 MS	5.8 MS
IS ACCELERATION CURVE UNIMODAL?	YES	YES

TEST MEETS SPECIFICATIONS

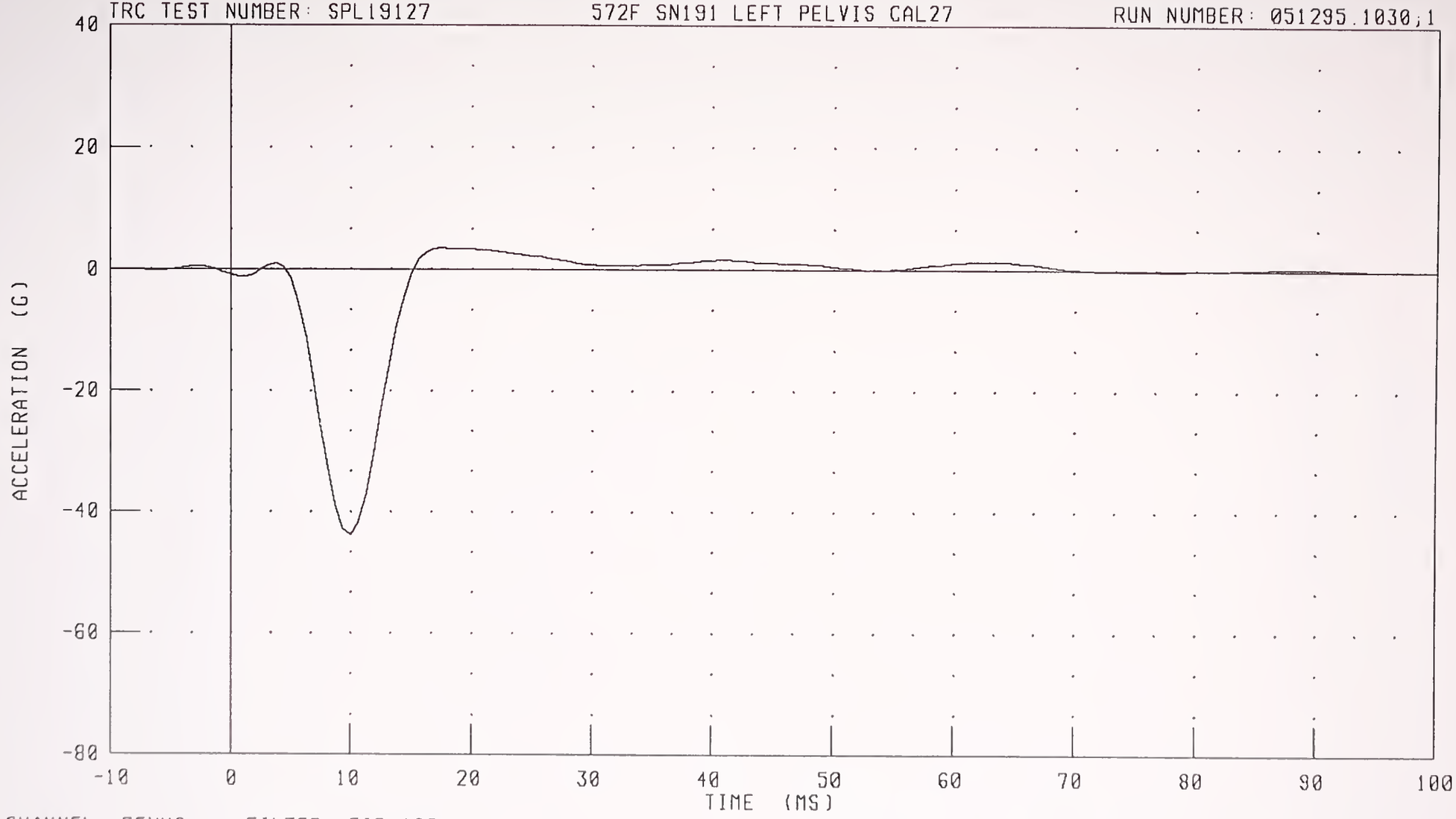
TECHNICIAN Rita Fo St

RUN NUMBER: 051295.1015;1

PART 572-F S.I.D. PELVIS CALIBRATION - (LEFT SIDE IMPACT)

PELVIS ACCELERATION Y AXIS

TRC TEST NUMBER: SPL19127 572F SN191 LEFT PELVIS CAL27 RUN NUMBER: 051295.1030;1



CHANNEL PEVYG FILTER FIR 100

PEAK DATA: 3.47 G @ 17.50 MS, -43.82 G @ 10.00 MS

Appendix D

Miscellaneous Test Information

Dummy Instrumentation Placement

Dummy Manufacturer & S/N: First Technology #199

Seating Position: Driver

Description	Axis	Manufacturer	Model	S/N	Orientation (+ Sensing)
Left lower spine acceleration	Y	Endevco	7264	CR21H	Left
Left lower spine acceleration Redundant	Y	Endevco	7264	AGRG8	Left
Left upper rib acceleration	Y	Endevco	7264	EA78J	Right
Left upper rib acceleration Redundant	Y	Endevco	7264	CY39H	Right
Left lower rib acceleration	Y	Endevco	7264	CY62H	Right
Left lower rib acceleration Redundant	Y	Endevco	7264	CC91H	Right
Pelvis acceleration	Y	Endevco	7264	CY92H	Left
Pelvis acceleration Redundant	Y	Endevco	7264	CC11H	Right

Dummy Instrumentation Placement

Dummy Manufacturer & S/N: First Technology #191

Seating Position: Left rear passenger

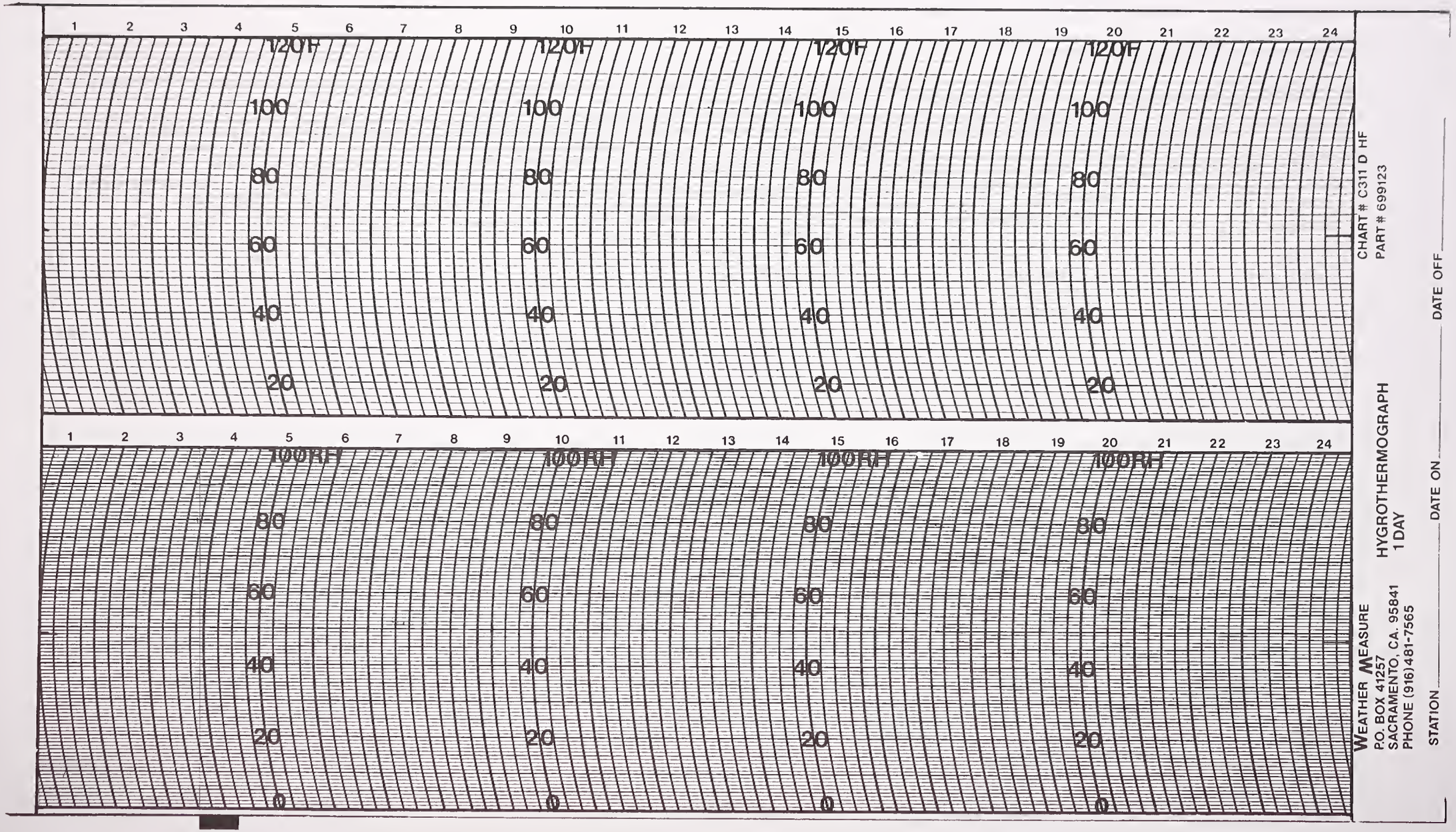
Description	Axis	Manufacturer	Model	S/N	Orientation (+ Sensing)
Left lower spine acceleration	Y	Endevco	7264	A81JJ	Left
Left lower spine acceleration Redundant	Y	Endevco	7264	A56JJ	Left
Left upper rib acceleration	Y	Endevco	7264	A20FJ	Right
Left upper rib acceleration Redundant	Y	Endevco	7264	AGRG5	Right
Left lower rib acceleration	Y	Endevco	7264	A31FJ	Right
Left lower rib acceleration Redundant	Y	Endevco	7264	AGRH9	Right
Pelvis acceleration	Y	Endevco	7264	A85JJ	Left
Pelvis acceleration Redundant	Y	Endevco	7264	CH67H	Right

Vehicle Instrumentation Placement

No.	Location	Axis	Manufacturer	Model	S/N	Orientation (+ Sensing)
1	Right front sill	X	Endevco	7264	AJ790	Rear
		Y	Endevco	7264	AJ7J9	Left
		Z	Endevco	7264	AJ7F8	Up
2	Right rear sill	X	Endevco	7264	AJ8C5	Front
		Y	Endevco	7264	AJ798	Left
		Z	Endevco	7264	AJ454	Up
3	Rear battery box	Y	Endevco	7264	BE69J	Right
		Z	Endevco	7264	EJ69J	Up
4	Left rear sill	Y	Endevco	7264	AJ708	Right
5	Left front sill	Y	Endevco	7264	AJ7W3	Right
6	Left front door centerline	Y	Endevco	7264	AJ452	Left
7	Right rear seat	Y	Endevco	7264	AJ5P2	Right
8	Left front door mid - rear	Y	Endevco	7264	AJ7Y4	Left
9	Left front door upper centerline	Y	Endevco	7264	AJ455	Left
10	Left rear door mid - rear	Y	Endevco	7264	AJ7W9	Left
11	Left rear door upper centerline	Y	Endevco	7264	AJ7K0	Left
12	Front battery box	Y	Endevco	7264	AJ5P0	Right
		Z	Endevco	7264	AE9B7	Up

Moving Deformable Barrier Instrumentation Placement

No.	Location	Axis	Manufacturer	Model	S/N	Orientation (+ Sensing)
1	Center of gravity	X	Endevco	7264	AC9H1	Rear
		Y	Endevco	7264	ADAW3	Right
		Z	Endevco	7264	AF9J0	Up
2	Left frame rail over rear axle	X	Endevco	7264	AGAC4	Front
		Y	Endevco	7264	BF11J	Left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100RH
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CHART # C311 D HF
PART # 699123
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